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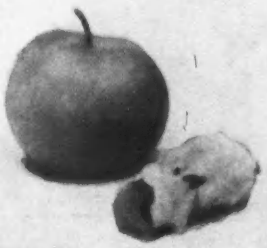

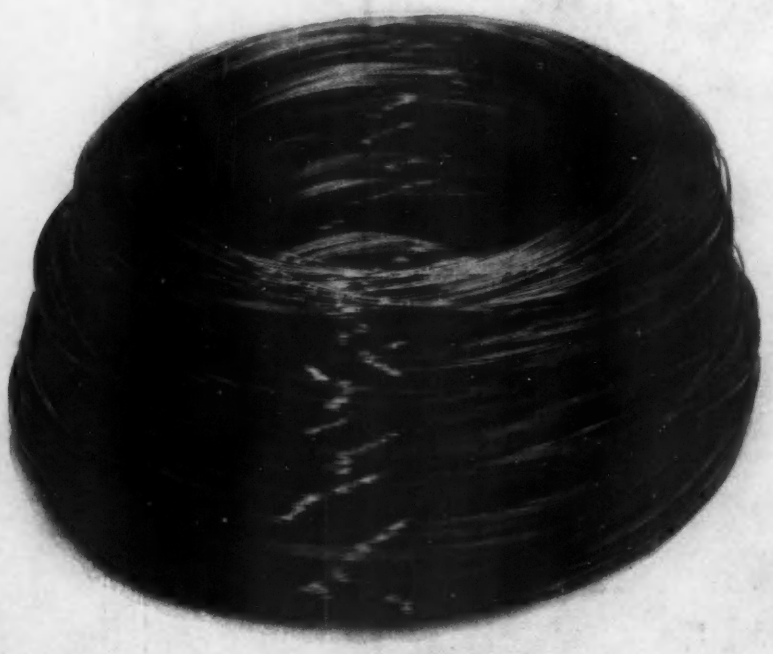

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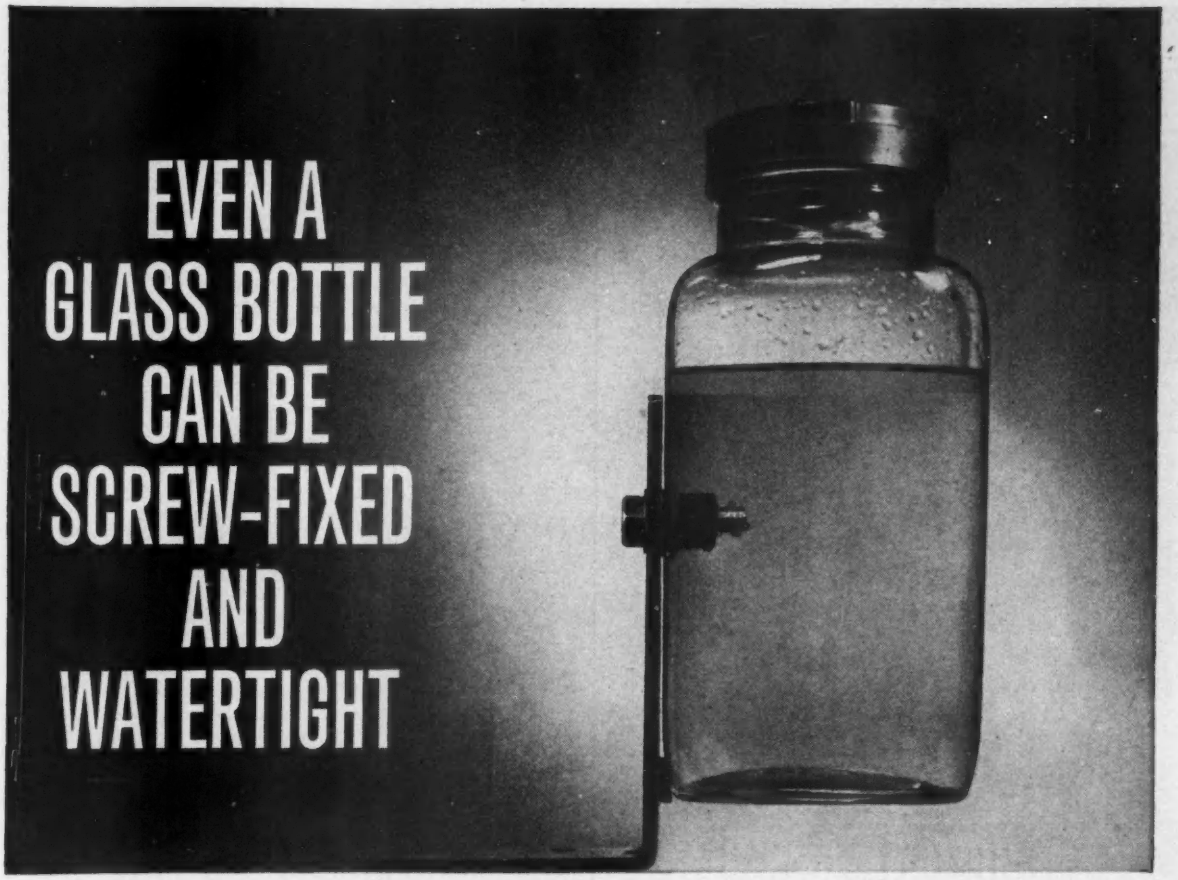

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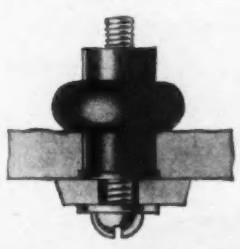	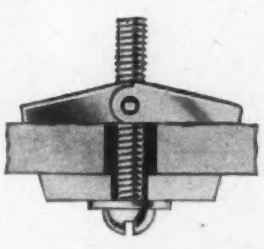	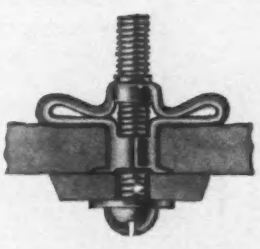

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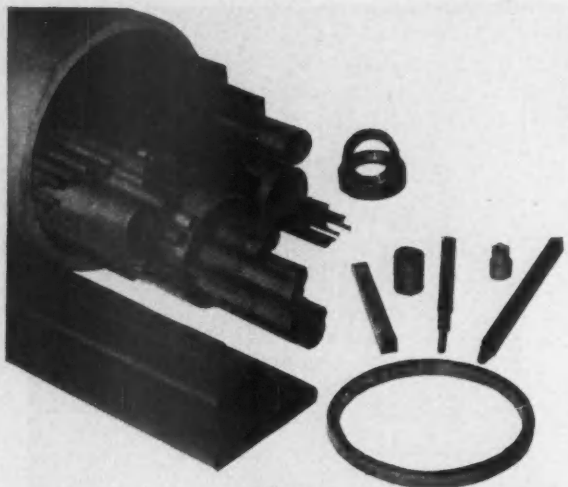

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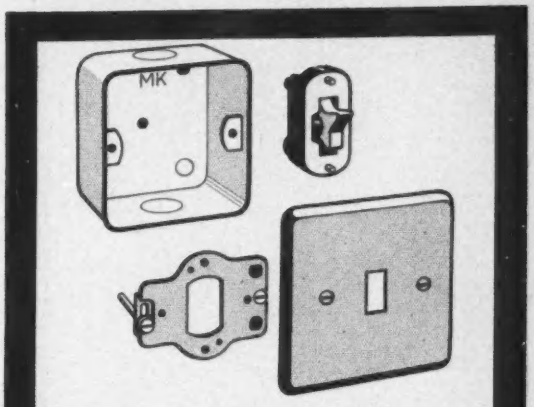

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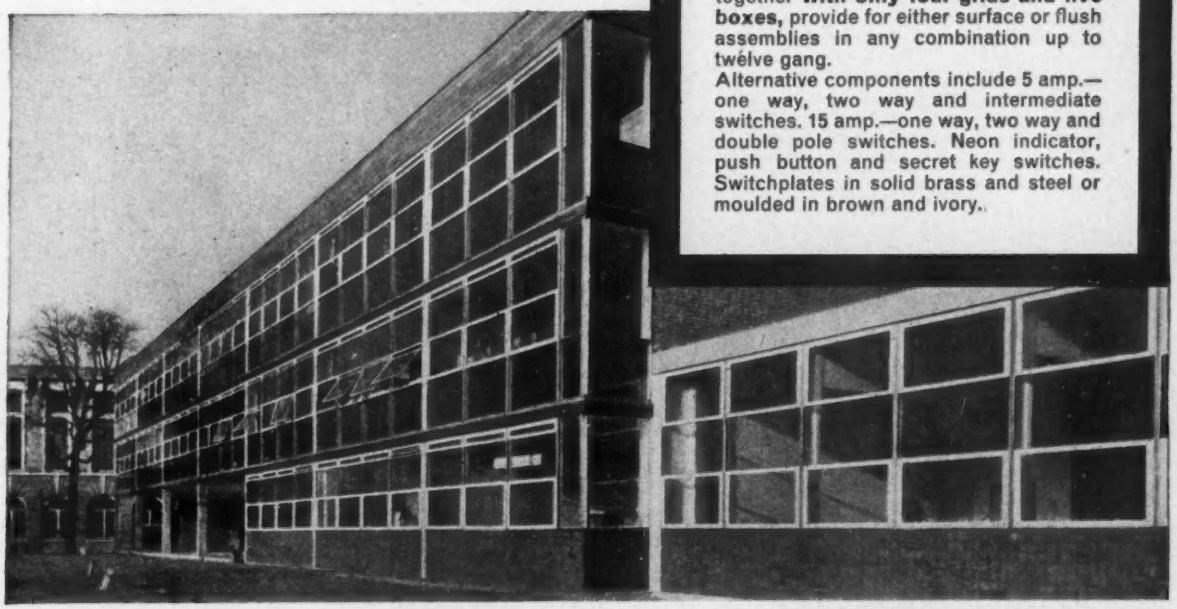
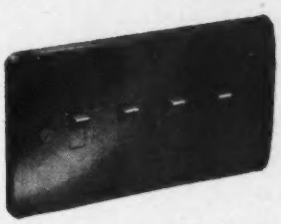
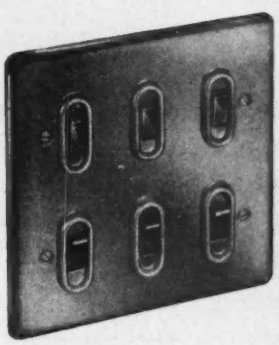
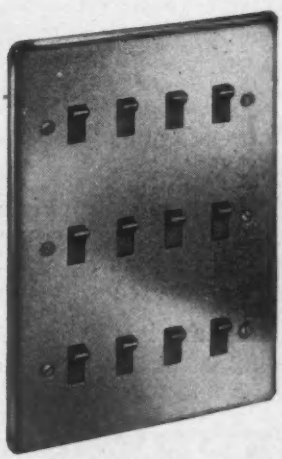


Photograph by courtesy of Architectural Review MK 210 DHB

Just a few of the infinite variety of MK Gridswitch Assemblies







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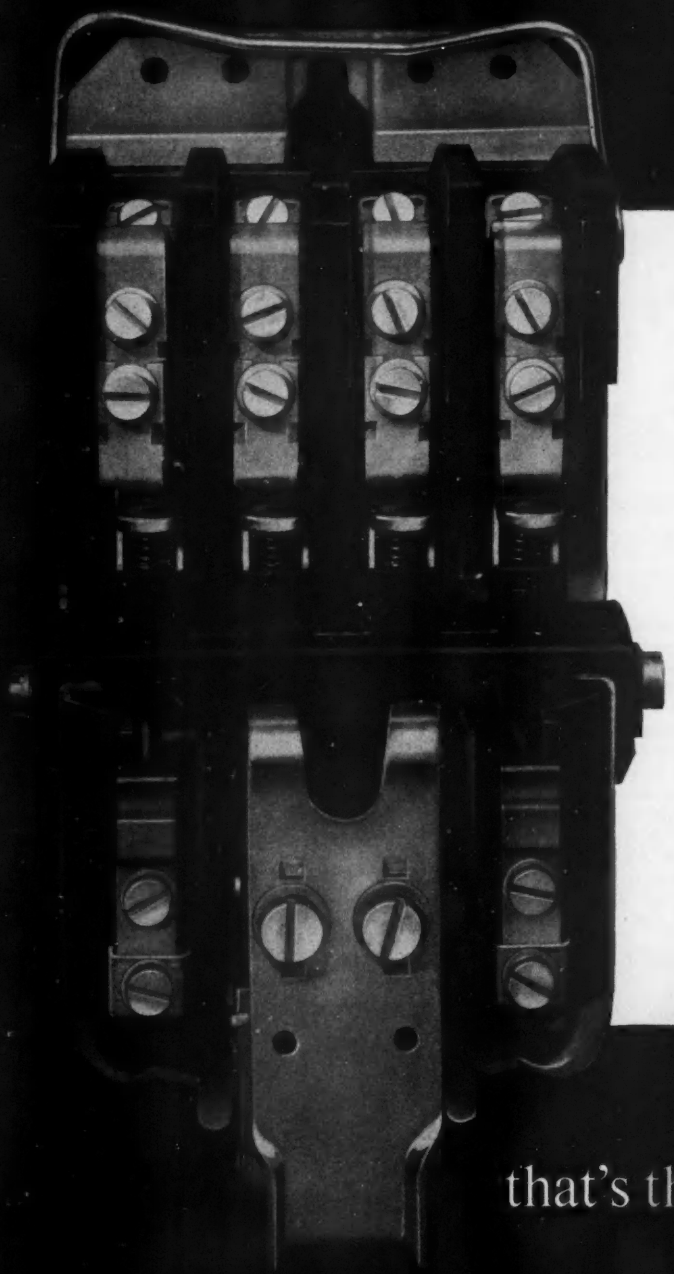

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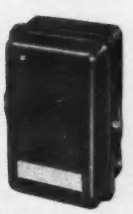

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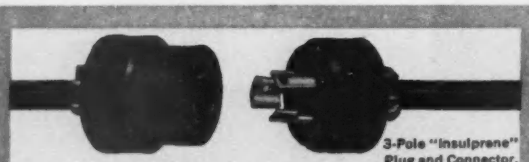

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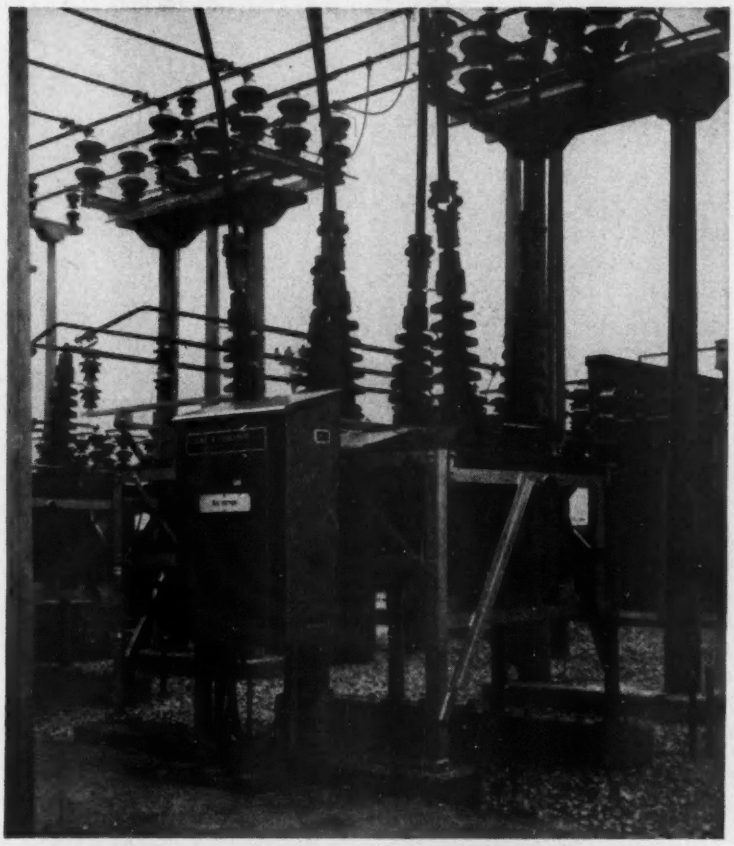

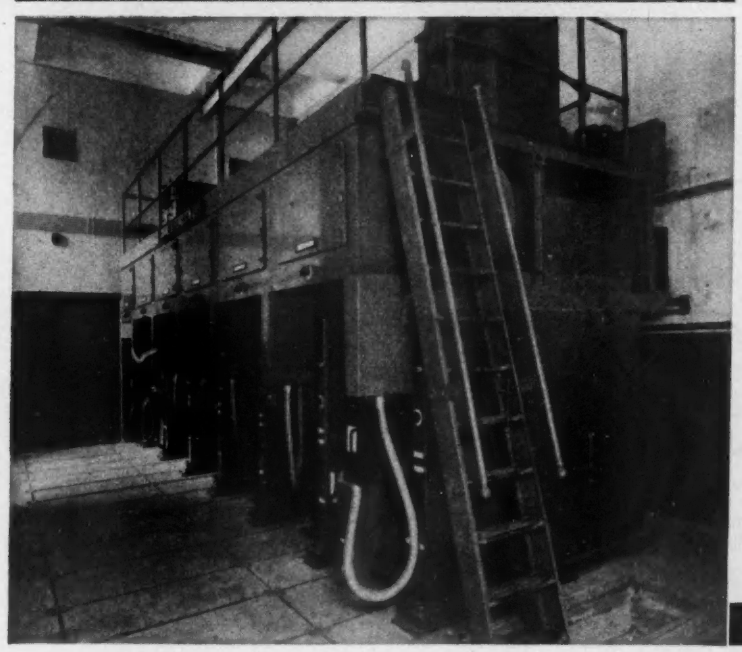

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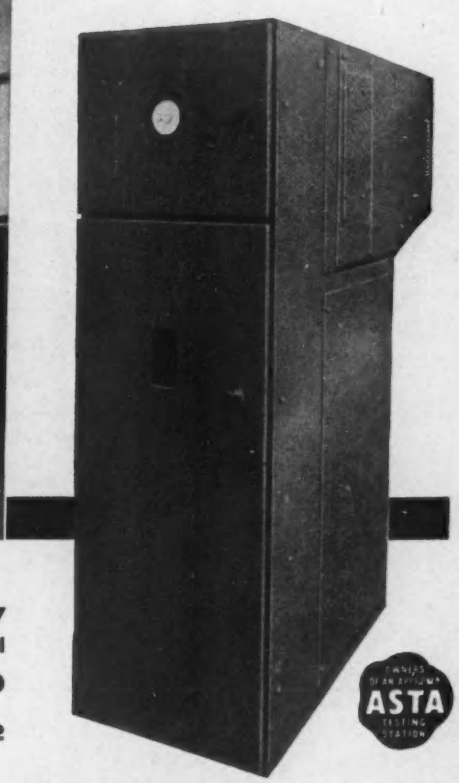

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Cable laying on the British Railways London Midland Region electrification scheme: photograph by courtesy of British Insulated Callender's Cables Ltd.

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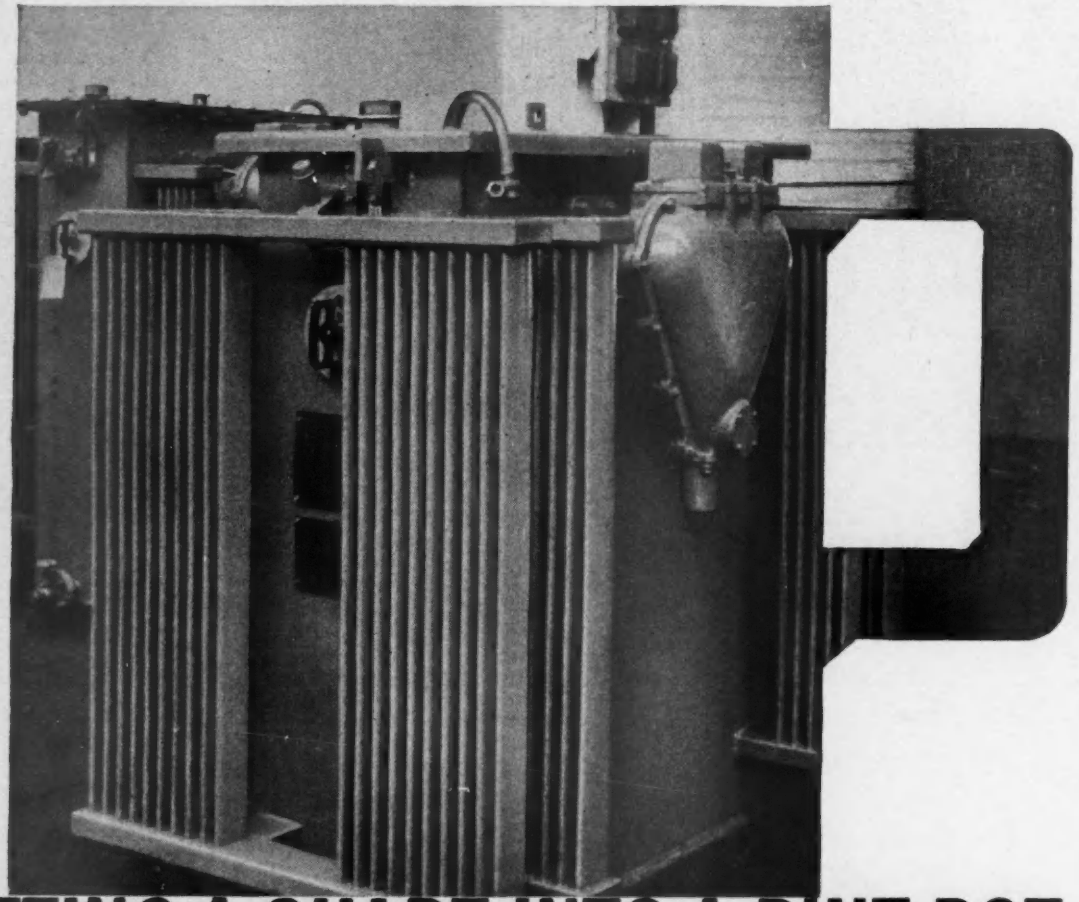

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Bradwell's first nuclear reactor became critical last Saturday with some 20% of fuel elements loaded; ahead of Berkeley, which is now also loading fuel, expected to go critical shortly. Care taken in fuel loading illustrated. (269)

Consent for oil-burning power station at Fawley on Southampton Water being sought by CEGB. Site of reclaimed land and saltings, suitable for 2,000 MW station, is outside modified Green Belt boundaries. CEGB may also seek station site in S. Yorkshire (possibly at Gowdall) or near Nottingham. (252, 274)

Central board for production of gas proposed by Select Committee on Nationalised Industries in report on gas industry. Economic gas production demands much larger Lurgi plants with oil gas enrichment, too large for individual boards. Their installation would demand gas grid for distribution. (251)

Twenty-eighth Radio Show opens at Earls Court with accent on colour television and possible change to 625-line reception. GEC-Sobell stage exhibition at Horticultural Hall with demonstration of new French SECAM colour TV system. (264)

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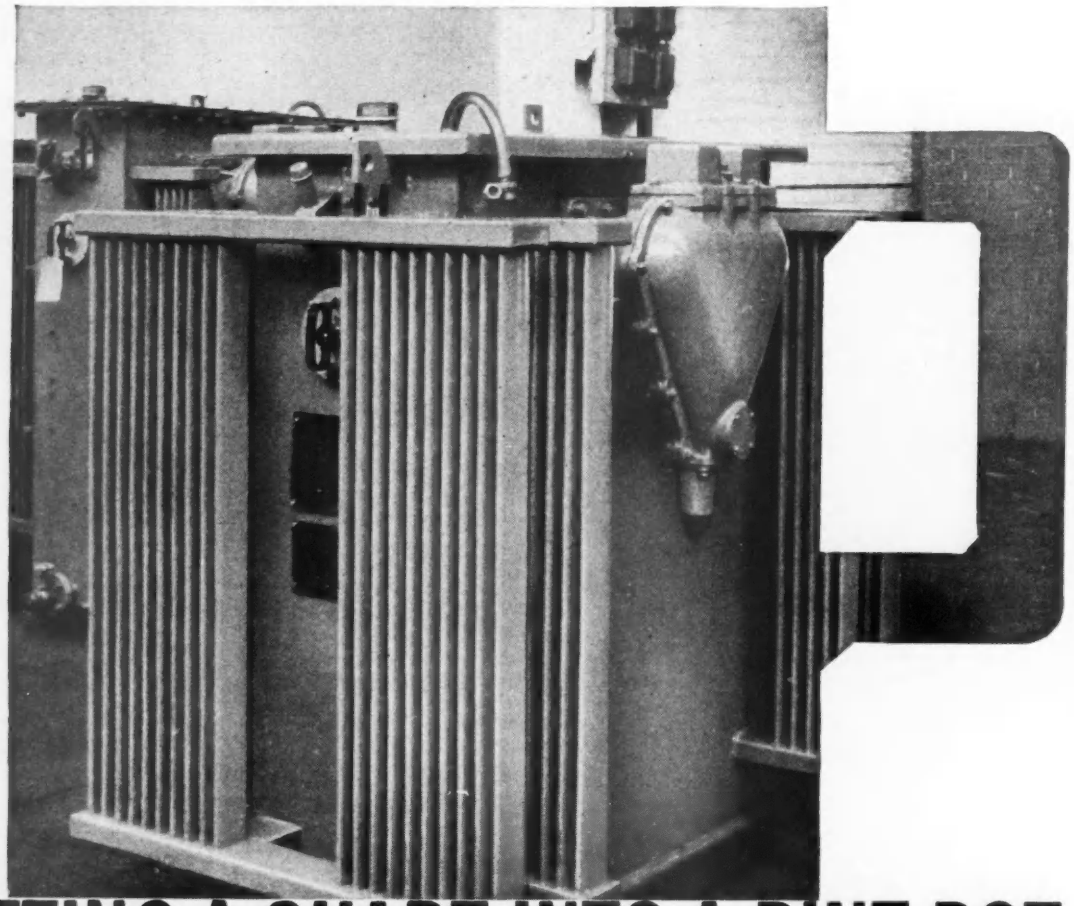

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NEWS SHEET

Electronics technique applied to summation metering for electricity supply gives improved reading accuracy with digital read-out, reduction of maintenance and retention of reading if supply failure occurs. Thyratrons used originally but transistors gaining ground. (252, 253)

Electrical appliance statistics collated in one volume by BEAMA for year 1960. Subscription service to members and non-members includes publication of quarterly supplements. (251, 275)

3·6 MW used for stress-relieving pressure vessel of first Hunterston reactor. 400 thermocouples used in elaborate instrumentation and control installation using digitisers feeding electric typewriters. (252, 259)

Electric service on Fenchurch Street line again postponed; overhead lines might not have been ready on 11 Sept. and EE to modify motors on trains; no serious trouble but some alteration considered desirable. (277)

Another slurry burning station for South Scotland. Board seeks consent for new power station at Methil Docks, Fife, with planned capacity of 60 MW. (252, 274)

Experimental 30-mile data transmission link demonstrates feasibility of remote processing of information. STC make use of GPO line to transmit at 1,000 bauds to distant computer. (274)

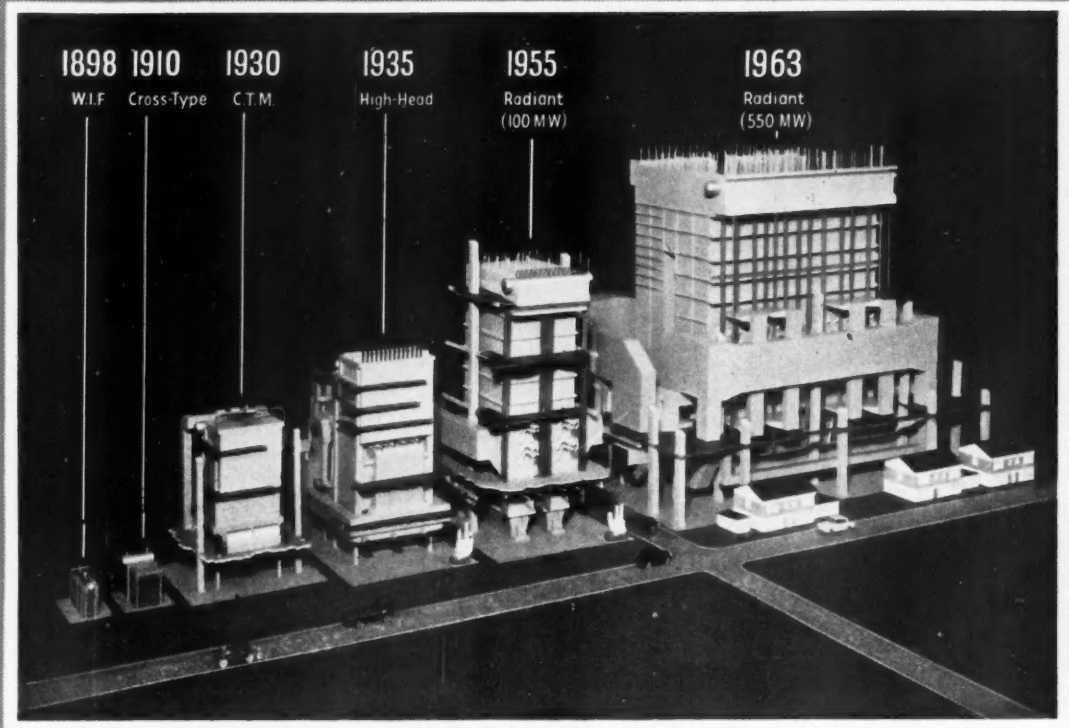
Economic advantages claimed for solid aluminium cable in table giving percentage savings over copper for different sizes and types of cable. (261)

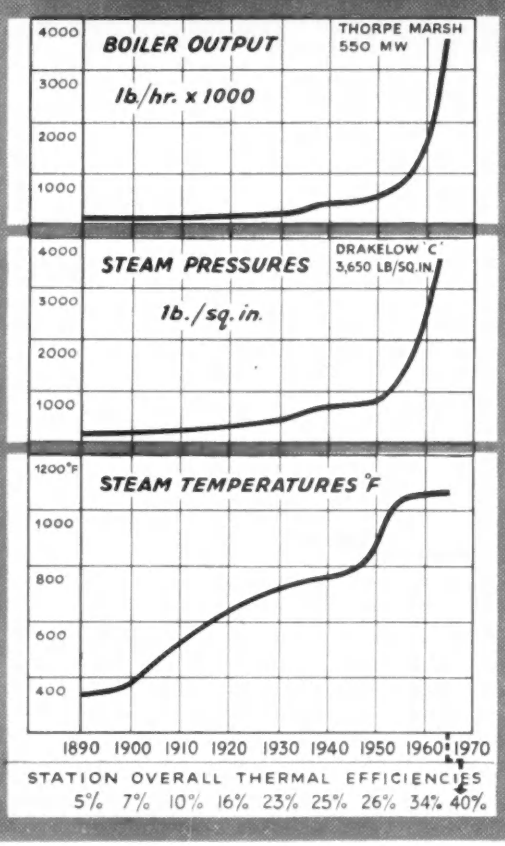
2,600 electricians strike in Eire; Labour Court's recommendation of 6d/hr increase and 2½ hr cut in working week rejected. At least 1s/hr rise claimed. (277)

BUSINESS—American firm producing lamp machinery buys Bedford factory (274) . . . E. Africa Power chairman expects another good year . . . Small profits from appliances, say Wilkins and Mitchell . . . Mann Egerton plan debenture issue . . . Walker, Crosweller to float shares . . . Shareholders take up only 18% of Nuclear Investment issue . . . Strong order intake for Parmiter, Hope and Sugden . . . Steady interim by Sun Electrical. (280)

OVERSEAS—$23,500,000 World Bank loan for Trinidad and Tobago EC . . . Two plans for Victoria Falls power development . . . English Electric and Richard Costain to build El Cadillal h.e. project in Argentina . . . Balloons used in o.h. erection across Naruto Straits, Japan . . . India presents third Five Year Plan . . . Shawinigan Water and Power Co. to build another 113·5 MW h.e. plant on St. Maurice. (279)

THE MARCH OF STEAM





Progress in power generation, to the present stage of a single boiler to serve a 550 MW set or to operate at supercritical pressure, with central-station thermal efficiencies of the order of 40%, has followed the path of advancing steam technology and engineering, an advance in which, for well over half a century, the BABCOCK organization has been in the lead.

The illustrations show the development of central-station boiler units, in size, type and steam conditions over a period of some 70 years. The steep rise over the last decade reveals design and manufacturing capabilities that are keeping British boiler engineering in the forefront of world development. 98% of Britain's, and 80% of the world's electrical power is steam generated—a high proportion of it using BABCOCK boiler plant.

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NEWS SHEET

Electronics technique applied to summation metering for electricity supply gives improved reading accuracy with digital read-out, reduction of maintenance and retention of reading if supply failure occurs. Thyratrons used originally but transistors gaining ground. (252, 253)

Electrical appliance statistics collated in one volume by BEAMA for year 1960. Subscription service to members and non-members includes publication of quarterly supplements. (251, 275)

3·6 MW used for stress-relieving pressure vessel of first Hunterston reactor. 400 thermocouples used in elaborate instrumentation and control installation using digitisers feeding electric typewriters. (252, 259)

Electric service on Fenchurch Street line again postponed; overhead lines might not have been ready on 11 Sept. and EE to modify motors on trains; no serious trouble but some alteration considered desirable. (277)

Another slurry burning station for South Scotland. Board seeks consent for new power station at Methil Docks, Fife, with planned capacity of 60 MW. (252, 274)

Experimental 30-mile data transmission link demonstrates feasibility of remote processing of information. STC make use of GPO line to transmit at 1,000 bauds to distant computer. (274)

Economic advantages claimed for solid aluminium cable in table giving percentage savings over copper for different sizes and types of cable. (261)

2,600 electricians strike in Eire; Labour Court's recommendation of 6d/hr increase and 2½ hr cut in working week rejected. At least 1s/hr rise claimed. (277)

BUSINESS—American firm producing lamp machinery buys Bedford factory (274) . . . E. Africa Power chairman expects another good year . . . Small profits from appliances, say Wilkins and Mitchell . . . Mann Egerton plan debenture issue . . . Walker, Crosweller to float shares . . . Shareholders take up only 18% of Nuclear Investment issue . . . Strong order intake for Parmiter, Hope and Sugden . . . Steady interim by Sun Electrical. (280)

OVERSEAS—$23,500,000 World Bank loan for Trinidad and Tobago EC . . . Two plans for Victoria Falls power development . . . English Electric and Richard Costain to build El Cadillal h.e. project in Argentina . . . Balloons used in o.h. erection across Naruto Straits, Japan . . . India presents third Five Year Plan . . . Shawinigan Water and Power Co. to build another 113·5 MW h.e. plant on St. Maurice. (279)

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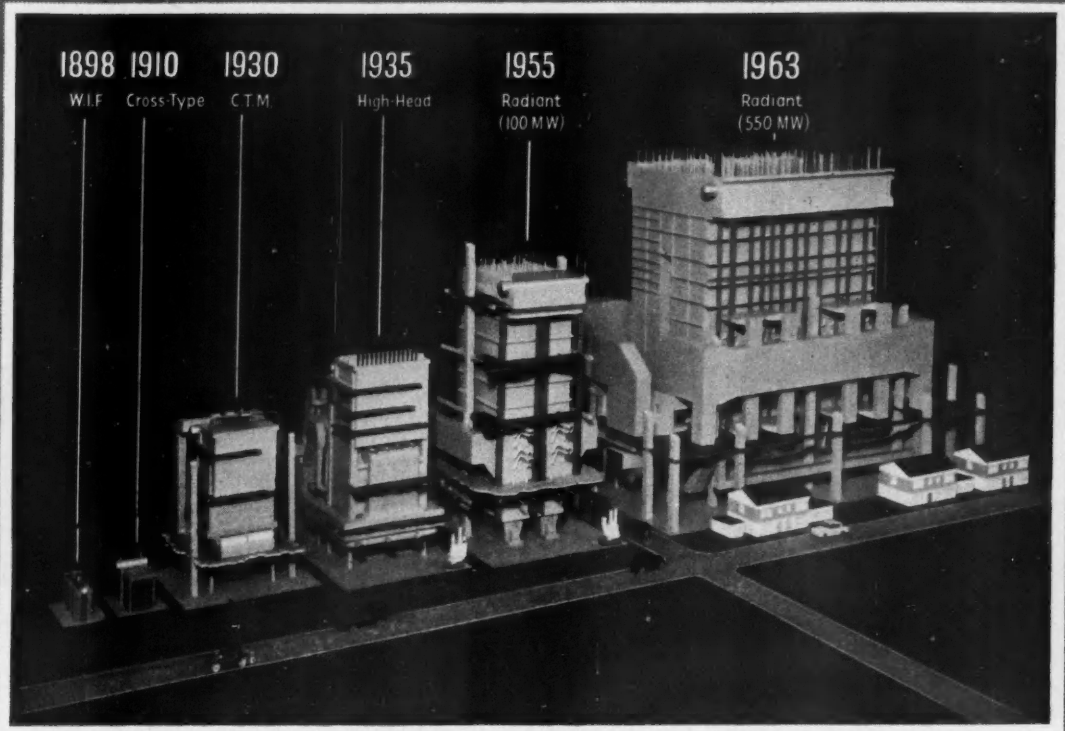

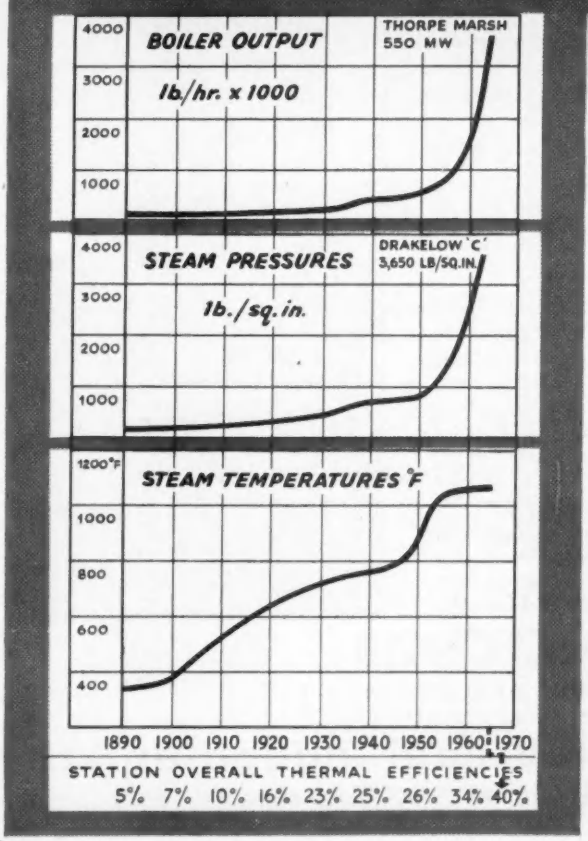

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The illustrations show the development of central-station boiler units, in size, type and steam conditions over a period of some 70 years. The steep rise over the last decade reveals design and manufacturing capabilities that are keeping British boiler engineering in the forefront of world development. 98% of Britain's, and 80% of the world's electrical power is steam generated—a high proportion of it using BABCOCK boiler plant.

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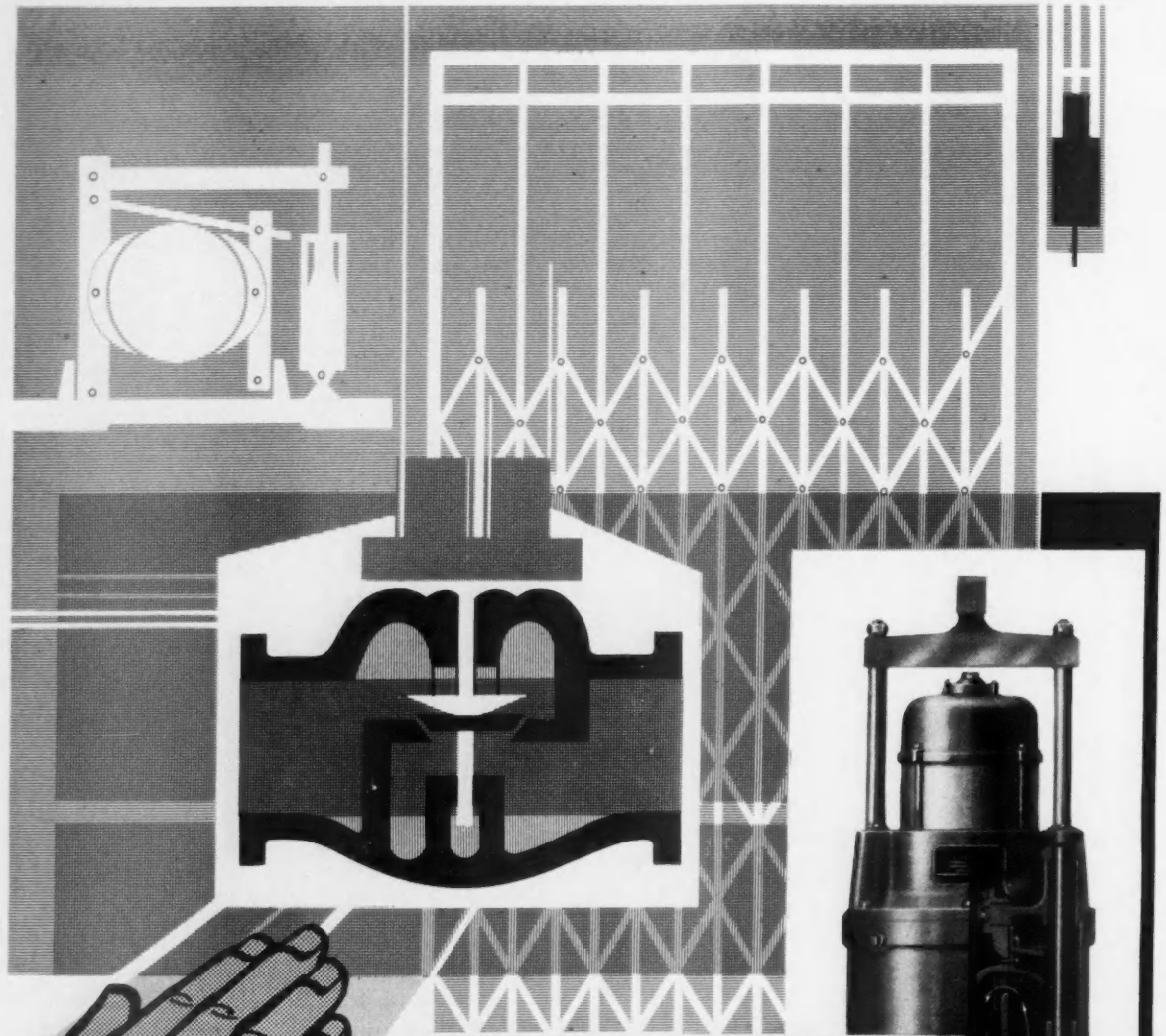

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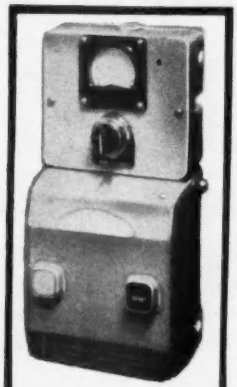

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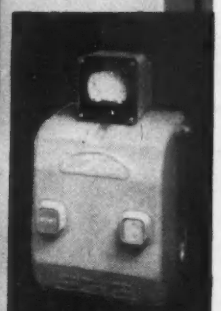
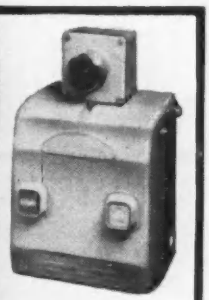


Both its lift-out mechanism and its case are firmly mounted with the minimum of fixing screws



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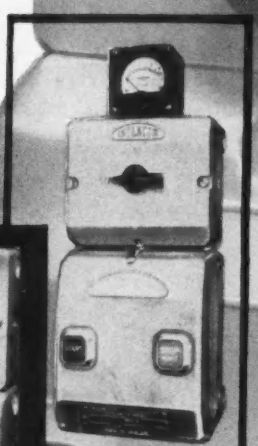

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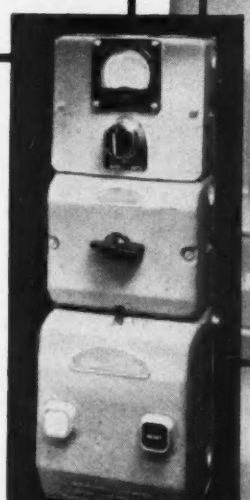

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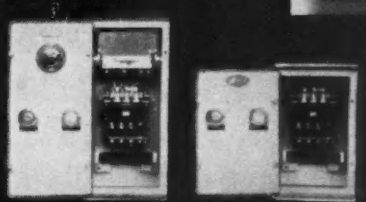

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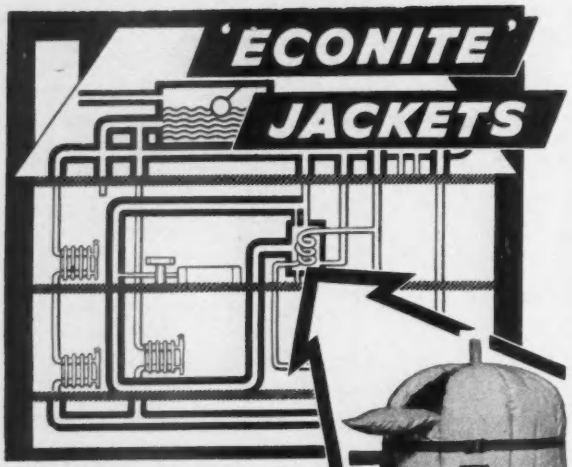

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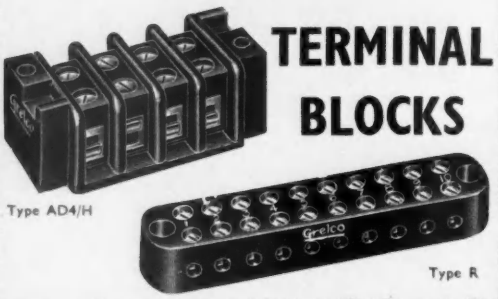

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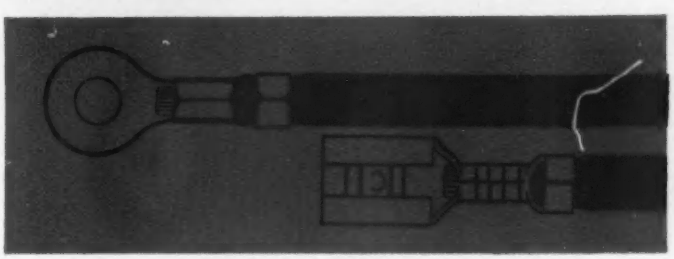

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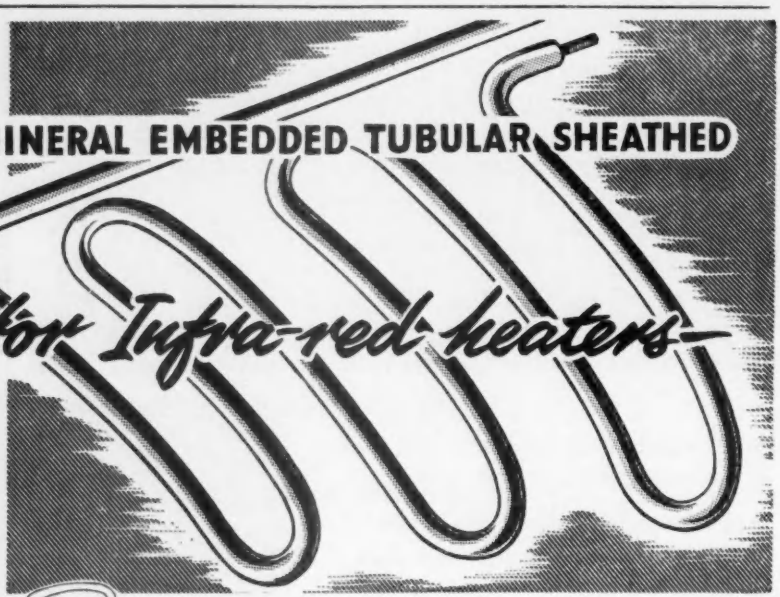

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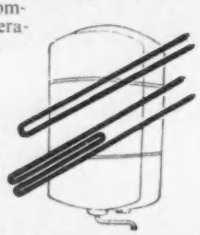

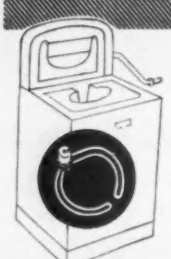

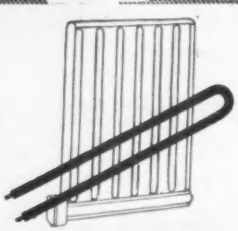

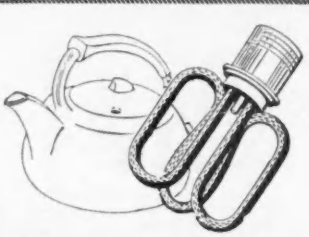

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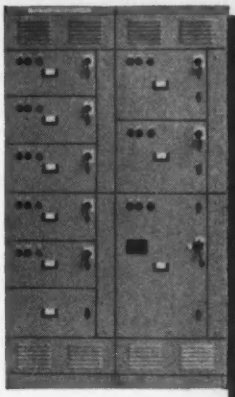

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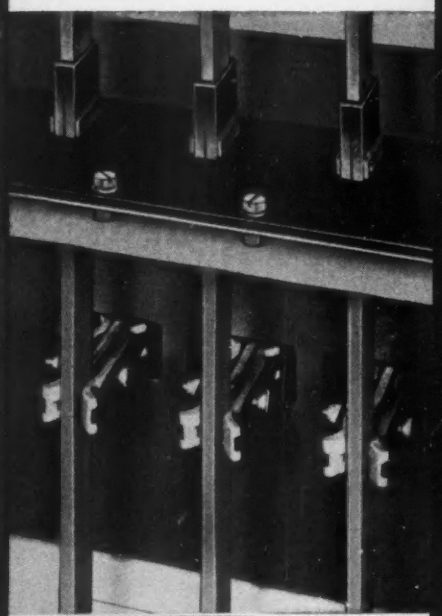

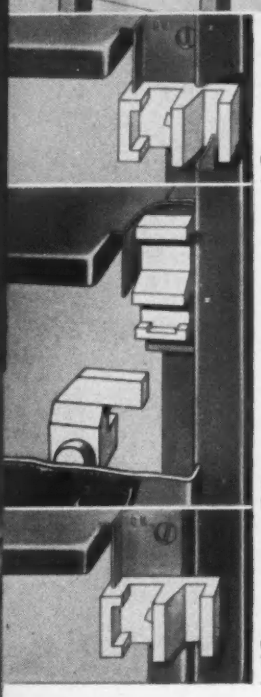

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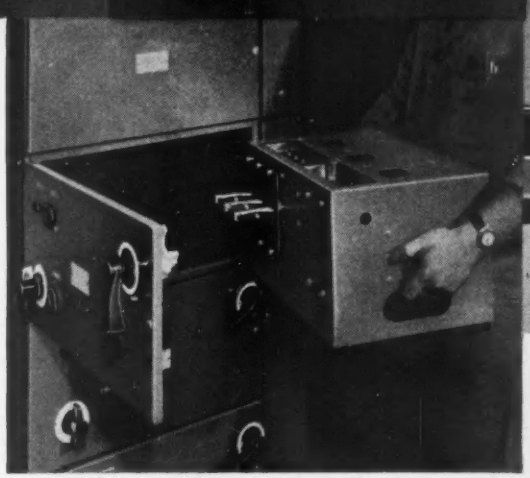

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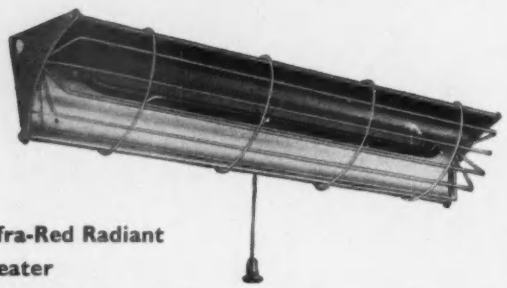

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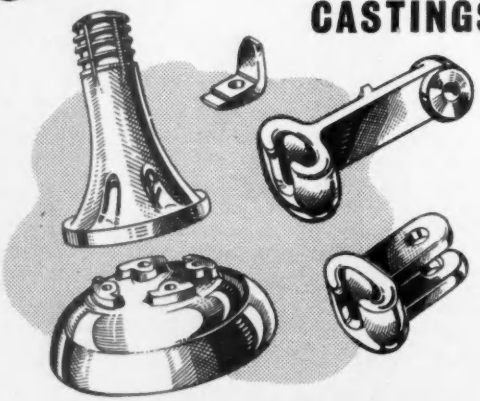

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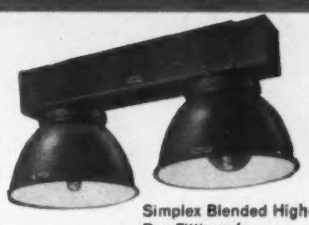

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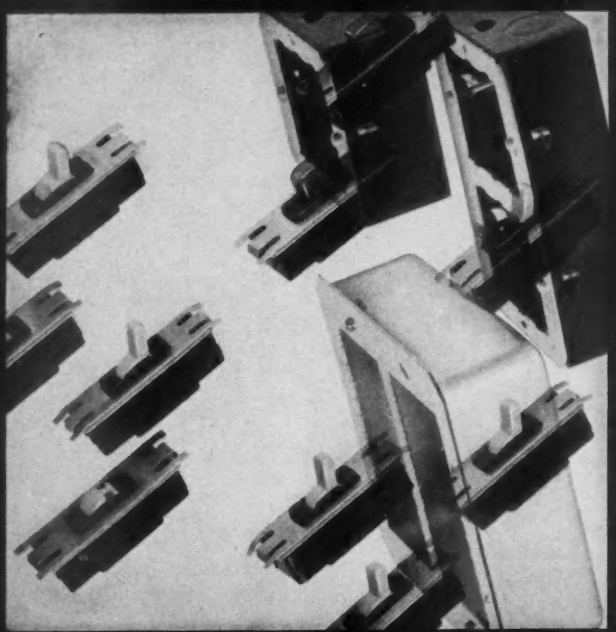

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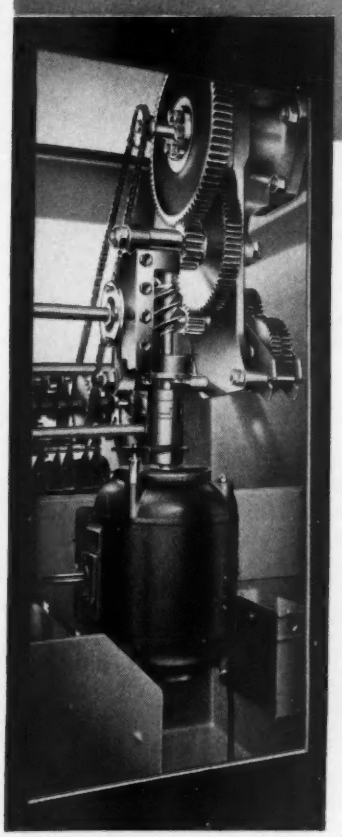

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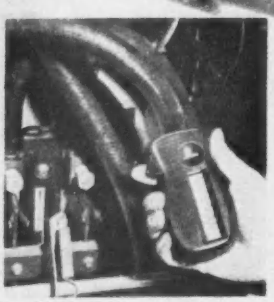
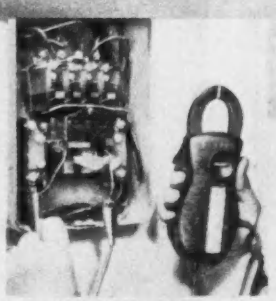


AS AN AMMETER: snapped around conductors to balance circuits.



AS AN OHMMETER: check resistance of motor control solenoid coil.

AS A VOLTMETER (large photo): check voltage on slipring of motor.

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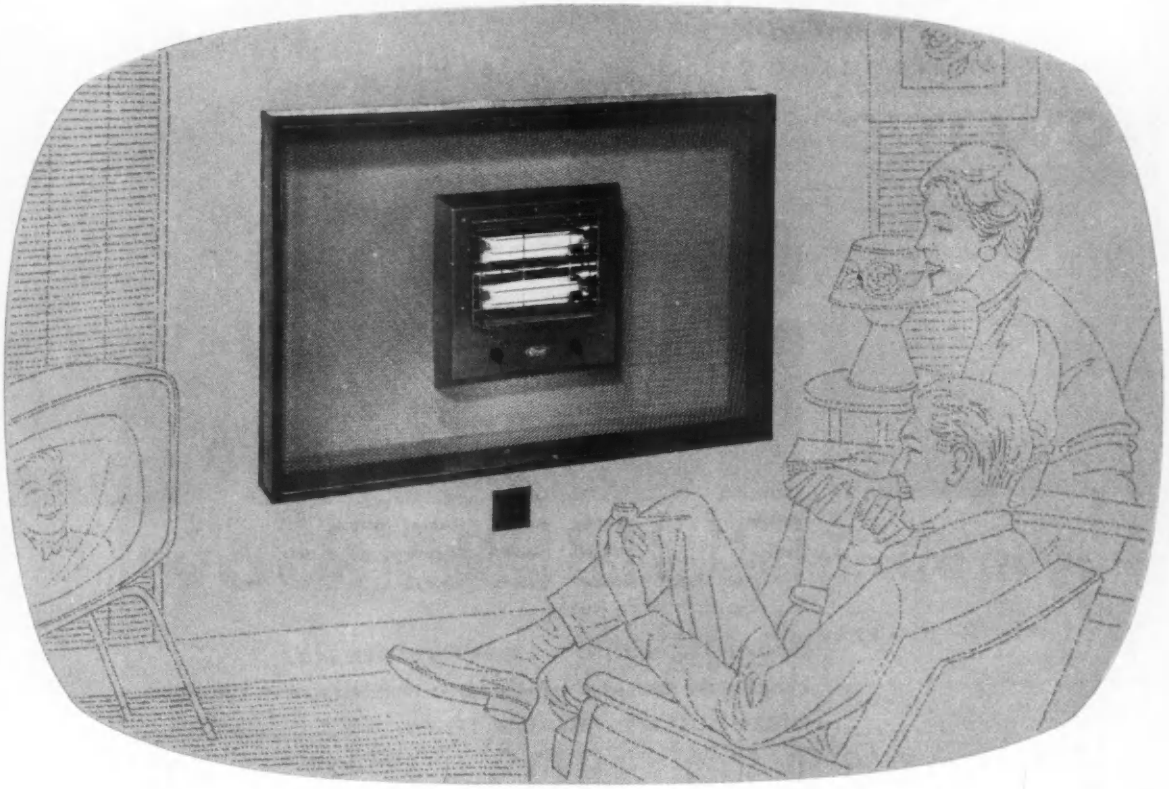

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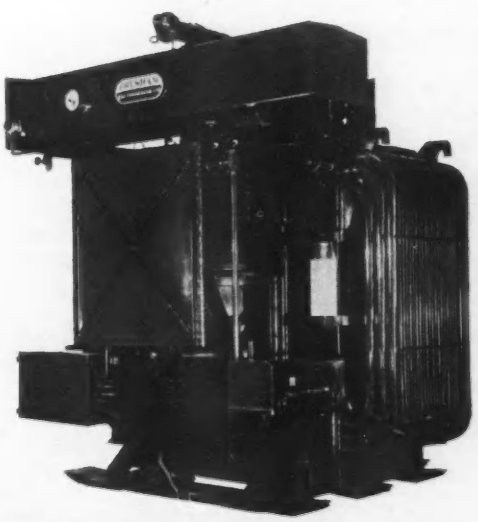

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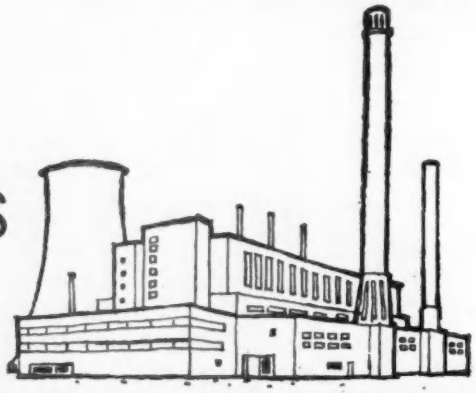

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THURSDAY 24 AUGUST, 1961
Registered as a Newspaper Volume 140 No. 8

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt . Estrand Telephone: HOLborn 6016

Dans ce numéro

L'électronique appliquée au télémesurage ... 253

Des compteurs précis d'addition se servant de circuits électroniques ont été mis au point pour le télémesurage des alimentations d'électricité. On se sert de compteurs à impulsions pour alimenter l'équipement électronique de stockage, de balayage et de totalisation dans le cas des clients industriels importants. Le totalisateur se compose d'un ensemble d'alimentation, d'un amplificateur transistorisé et d'un entraînement électro-mécanique, étudiés de façon à ce qu'il n'y ait pas de renseignements perdus en cas de panne d'électricité. Les premiers appareils se servaient de thyratrons, mais ceux-ci ont été actuellement remplacés par des transistors. Récente mise au point: un compteur à impulsions qui fournit les impulsions sans contacts métalliques, en désaccordant un signal haute fréquence à chaque tour du compteur.

Instrumentation pour la réduction de contrainte ... 259

La cuve sous pression pour la réacteur de la centrale nucléaire de Hunterston nécessitait la réduction de contrainte à 550°C pendant 12 heures, suivie d'un refroidissement lent. On se servit de 3,6 MW de chauffage électrique, obtenus depuis des appareils de chauffage métalliques à radiation montés à l'intérieur de la cuve sous pression et des canalisations de gaz. Presque 400 thermocouples furent utilisés conjointement avec des machines à écrire numériques et des enregistreurs sur bande pour mesurer les températures de la cuve. Une maquette de la cuve permettait de vérifier rapidement leur emplacement.

Salon britannique de la radio 264

Au Salon de la radio qui se tiendra à Londres cette année, les fabricants feront état de leur capacité de fabriquer des téléviseurs pour la couleur si une décision est prise relativement à la transmission en couleur. Certains des téléviseurs exposés comportent aussi des dispositifs permettant la réception d'images à 625 lignes à la place de la norme britannique actuelle qui a été utilisée pendant 25 ans. Il y a une demande croissante pour des postes radio portatifs transistorisés.

In dieser Nummer

Anwendung von elektronischen Methoden für Zähler 253

Für die Messung des Elektrizitätsverbrauches wurden genaue Summenzähler entwickelt, welche elektronische Schaltkreise verwenden. Impulsgebende Zähler speisen elektronische Speicher-, Abtast- und Summierungsgeräte für industrielle Grossverbraucher. Das Summierungsgerät besteht aus dem Spannungsversorgungsgerät, Transistorverstärker und elektro-mechanischem Antrieb. Das Gerät ist so eingerichtet, dass auch im Falle des Ausbleibens der Netzspannung die gespeicherte Information nicht verloren geht. In den ursprünglichen Geräten wurden Thyratrons verwendet, die derzeitigen Geräte sind jedoch ausschliesslich mit Transistoren bestückt. Eine der neuen Entwicklungen ist ein impulsgebender Zähler, welcher während jeder Umdrehung des Zählers die Impulse, ohne metallische Kontakte, nur durch Verstimmung einer Hochfrequenzschwingung erzeugt.

Instrumentierung für Spannungsentlastung 259

Der Druckbehälter des Kernreaktorkraftwerkes Hunterston musste zur Spannungsentlastung für 12 Stunden auf 550°C erhitzt werden und danach langsam abkühlen. Die elektrische Heizleistung betrug 3,6 MW. Sie wurde durch Strahlungsheizelemente in dem Behälter und in den Gasleitungen zugeführt. In Verbindung mit digitalen elektrischen Schreibmaschinen und mit Streifenschreibern wurden nahezu 400 Thermoelemente zur Messung der Temperatur des Behälters verwendet. Die Lage der einzelnen Thermoelemente konnte mit Hilfe eines Modelles des Gefässes schnell nachgesehen werden.

Die britische Radioausstellung 264

Auf der diesjährigen Radioausstellung in London demonstriert die Radioindustrie ihre Fähigkeit, Farbfernsehgeräte herzustellen, falls eine Entscheidung für die Einführung des Farbfernsehens getroffen werden sollte. Ausserdem werden Fernsehgeräte, welche von dem seit 25 Jahren eingeführten britischen Fernsehsystem (405 Zeilen) auf das 625 Zeilensystem umgeschaltet werden können, gezeigt. Das Interesse an tragbaren Transistorempfängern nimmt ebenfalls zu.

Electronics Applied to Metering 253
by A. J. Baggott, M.I.E.E.

Drive for Better Office Lighting 258

Hunterston Vessel Stress-relieved 259

On the Fringe of Colour 264

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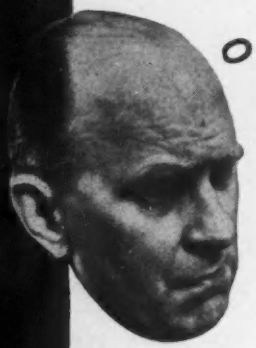
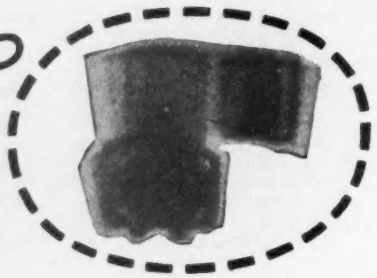
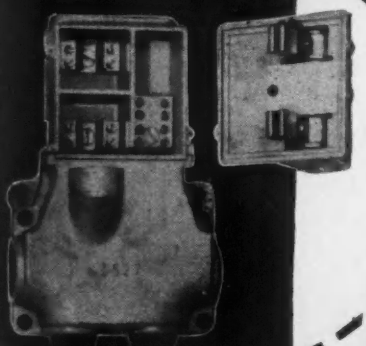
Distribution Problem?







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ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 24 AUGUST, 1961

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T. W. WRIGHT

Comment

GAS ON THE CARPET

It is something of a paradox that, in the early days of nationalisation, electricity board chairmen looked enviously at the autonomy of their opposite numbers in the gas industry. With that autonomy now achieved by electricity boards, the gas industry is looking to the electrical industry for the example of national planning at the centre. The Select Committee on Nationalised Industries last week, in its report on the gas industry, went further, and advocated setting up a thirteenth gas board with powers and functions roughly comparable to the CEGB. The reason advanced for such a statutory change is the advent of the Lurgi system of total gasification of coal. The two plants at present operating are considered inadequate in size to give economic gas production, the favourable performance of the Scottish plan being due to specially low cost fuel offered by the NCB. A Lurgi plant some four times the size is visualised as giving a more reasonable cost figure, but such a plant would be beyond the needs of a single gas board, and it is for this reason that central control of gas production is favoured. Such a scheme would call for a gas grid, but the Committee suggests that a national grid might cost more than the £31m estimated; instead, they visualise some £16m spent on limited trunk gas mains. The problems, however, do not end here. Lurgi production gives gas of low calorific value, and this must be enriched, the most favoured enrichment being imported gas or gas from oil refineries. As the cost per therm for such gas is substantially lower than that from even the largest of projected Lurgi plants and this low cost of enrichment gas is included in cost estimates of Lurgi projects, the economic case hardly appears to rest on a secure basis. The import of methane appears founded on sounder costing principles, but this also would require a miniature gas grid for distribution. Underground storage of gas is the favoured answer to the problem of peak loads. No doubt this report will stimulate thought on an industry of which it is admitted that time is not on its side. Whether it is wise to inject major capital development on large Lurgi plants under present circumstances should await a more detailed study of the technical, economic and amenity factors.

STUDY ON APPLIANCES

Only in the last few years have figures for the electrical appliance industry become reasonably adequate. Now there are available a volume of statistics from various sources, but usually with limited correlation. For the convenience of those who wish to study such figures, BEAMA have collated them and published a statistical

review embracing the whole, with a few curves and memoranda thrown in as an extra. In addition, it is proposed to issue quarterly supplements to those who subscribe to the service. Useful as this review will undoubtedly prove to be, with its chronicle of the ups and downs of the appliance industry and its suggestion of potentially unsaturated markets, it does not aim at any interpretation of the figures. It would have been of value to learn, for instance, if the regression formulae published by the National Institute of Economic and Social Research last year still apply to washing machines and refrigerators. If current figures are to influence forward planning then they must be available quickly. The earliest figures published are those of area board sales, but unfortunately they cannot be regarded as a statistical random sample. They are particularly useful for cookers, but have they a statistical meaning for other appliances? They foreshadowed the sharp drop in washing machine deliveries in June, 1960, but could they be made to yield other statistical trends? Refrigerators have such a strong seasonal component that the trend line is not easy to assess without statistical analysis. These are some of the questions which must be asked of statistics when served up in the volume the BEAMA provide. Perhaps such studies will be the next phase of the increasing activities of the Domestic Appliance Division.

CONTROL IN STRESS-RELIEVING

Just as the construction of nuclear reactor pressure vessels demanded new technological limits for the ability to weld thick steel plate, so new demands are being made on the flexibility of electric heating in stress-relieving such structures. In the case of Hunterston, advantage has been taken of modern instrumentation techniques to provide a special degree of control on the stress-relieving of the pressure vessel and an account of the detailed procedure is given on a later page. This 18-day operation was controlled by the use of no less than 400 thermocouples strategically placed. About 100 of these were connected to six strip chart recorders to give quick interpretation, but more elaborate methods were used for the remaining 300 thermocouples. These thermocouples were connected through four uniselectors, each of which operated not only an indicator but also a digitiser, the signal of which was decoded before passing finally to an electric typewriter. The decision to adopt a print-out technique for this operation underlines the close control considered necessary in stress-relieving such a large and complex structure, the final behaviour of which is so critical. In future nuclear stations the heavy steel pressure vessel may be replaced by pre-stressed concrete, for British manufacturers are thinking along these lines, and Oldbury-on-Severn may be the first nuclear station to have such a prestressed concrete pressure vessel as one tender submitted is based on such a design.

ELECTRONICS COMES TO METERING

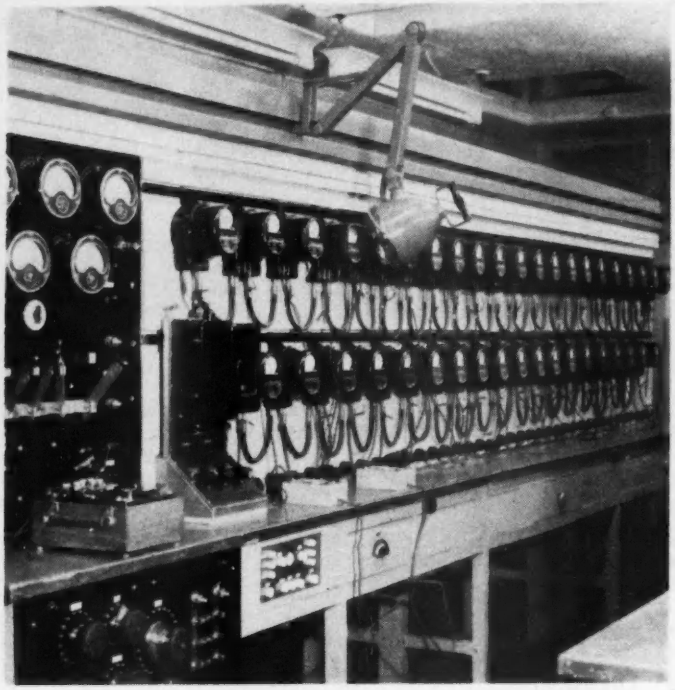
Considering that one of the earlier applications of electronics was to instrumentation, in valve voltmeters and the like, it has taken overlong for such techniques to be applied to the mundane task of metering electricity consumption. Yet when one considers the mechanical complexity of summation equipment, a technique based on impulsing so eminently suitable to electronic circuitry, it is surprising that such an obvious solution did not earlier overcome the doubts on reliability which seem to shadow electronic developments. The evolution and design of an electronic summator is referred to in the leading article this week, which recounts the work over several years of the London Electricity Board in this field. Early development made use of thyratrons for handling the pulses but, with the advent of more sophisticated types of semiconductor devices, these clearly strengthened the case for electronic methods of summation, which can offer greater accuracy with improved life and flexibility of design. It is hardly too much to say that if such techniques had been available when the first grid tariffs were introduced, the definition of maximum demand used today would be different. It was the very limitation of mechanical methods of summation that forced the words of the original (1926 Act) definition of "any consecutive 30 minutes" to be construed later by Statutory Instrument as any consecutive 30 minutes beginning at the hour or half-hour.

STATIONS WITHOUT COAL

Last week, applications for consent were made for two new thermal power stations, neither of which is to be designed for burning coal. One of these follows the successful operation of Barony in burning washery slurry and the announcement by the South of Scotland Board of their intention of erecting another slurry-burning station. The site chosen is at Methil on the coast of Fifeshire, so that supplies are drawn from a wholly different field from Barony on the west of Scotland. The new CEGB proposal for an oil-burning station at Fawley on Southampton Water also comes as little surprise. Last December they stated that of the two possible sites for nuclear stations in the area, Earnley was considered unsuitable and any decision on Hamstead would be deferred. At the same time, a strong hint was given of an alternative solution in the building of a conventional station on Southampton Water, with the qualification that if this was to be coal-fired it would materially increase the cost of generation. Siting an oil-fired station near the oil refinery is a logical solution but one possibly just in time, for it is known that the gas industry has for some time been contemplating a large-scale oil gasification plant at Fawley.

Meteor

This week's quick summary of electrical news faces advertisement page 10



Electronics applied to metering

by A. J. Baggott, M.I.E.E.*

Fig. 1. Stroboscopic lamp in use for checking meter calibration

ELECTRONICS have made their impact on the metering side of the electricity supply industry just as strikingly as in other branches of industry. Historically a logical technical development pattern over the years can be seen with the occasional and more striking events being given prominence. As an example, in May, 1950, in one of the London Electricity Board's testing stations, officers of the National Physical Laboratory, and the Ministry of Fuel and Power, accepted the electronic method of testing electricity meters under the 1936 Meters Act. The worth of this decision has since been well proved, economically and by the improved accuracy obtained. As illustrated in Fig. 1, a stroboscopic lamp runs along guide rails at the top of the meter bench. The lamp is electronically coupled to a standard rotating kWh meter to give 200 flashes/revolution. Each meter under test has its disc marked with 200 lines, so that they appear stationary when their calibration is correct. The standard meter, shown in its mounting on the left of the panel, has a tapped current transformer mounted below it. This enables the speed of the standard meter to be adjusted if the meters on test have different constants. The accuracy is checked by counting the impulses obtained from the standard meter and comparing them with those obtained from the meter under test, using a power amplifier and electronically driven counters.

Electronic Tariff Meter

A second event took place in April 1957, when a wholly electronic meter for tariff purposes was put on circuit for a major consumer (Fig. 6). This equipment integrated the maximum demand and kWh units of a 10-feeder system having a maximum demand of 6 MW, using impulse steps of 1 kWh per impulse.

In 1953, the first attempt directed at improving the quality of mechanical summation instruments was made, using thyratron assisted drives. The impetus needed for this improvement came from intensive efforts of the commercial side of the Electricity Board in applying the maximum demand tariffs. It was about this time too that the first reliable miniature pure metal cold cathode thyratron was put on the market, a tube which could be proved to have very long life with tolerances so close and performance so stable that equipment could be designed, theoretically, without risks that the interchange of tubes would cause errors. Thus the need existed and so did the tools.

The question was asked at this stage of the design "Why bother to attempt to improve existing mechanical summators by the use of electronics"? It was answered in three ways: first it appeared wrong, and certainly unnecessary, for a supply authority to impose a precise tariff of £x per kW, and yet in the measurement stage, make an estimation of the maximum demand. In this respect it was argued that a scale of limited length and sub-division read by semi-skilled operators was an estimation. A meter reading of, say, Y± 50 kW for a large consumer appeared on first sight to be reasonable percentage-wise, but more unreasonable in the light of the precise tariff or, say, £8 per kW if expressed in equivalent cash value of within £8Y±£400.

Secondly, the history of mechanical summators was not encouraging, much effort was still being spent in maintaining equipment on circuit. In the past attempts were made to increase the accuracy of mechanical equipment by increasing its operating speed. Unfortunately, higher speeds meant more wear and brought nearer the day when maintenance had to take place.

Thirdly, instrumentation appropriate to large consumers was seldom static, and inevitably there was a need to design equipment which could be readily extended, preferably without the disadvantage of losing revenue by closing down the installation.

To summarise, the need for an electronic summator was then and still is:

1. To satisfy a tariff more accurately (this means higher speeds and better indicators).
2. To lengthen the life of the instrument by dispensing with mechanical parts that wear.
3. To improve facilities for servicing and extension once it is on circuit.

* Mr Baggott is Meter and Test Superintendent (South), London Electricity Board.

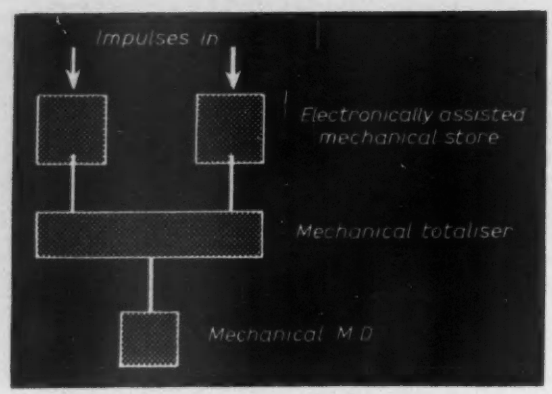


Fig. 2. Schematic of differential summator

In considering the design of an electronic summator, certain principles must be observed. First, the accuracy of the summation equipment should not be less than that of the individual impulsing meters. In this respect it can be said that with adequate care in design there is no reason why accuracy of the equipment fed from impulsing meters should not be absolute. The instrument should be simple in design and easy to manufacture, and the components selected for use in the summator should individually be simple. They should not deteriorate with age, this last point being just as true for the mechanical as for the electronic side. Ideally, there will be no mechanical movement as all mechanical devices are potentially bad wearers, but unfortunately, for memory purposes it is necessary to have at least the final dials mechanically driven.

Regarding the electronic components, there is no necessity for limited life tubes, electrolytic capacitors, under-rated components, or the usual type of printed board connectors. The design should be such that the individual units of the summator can be readily and simply manufactured in workshops using skill that is available. It should be simple to service once it is installed, there should be adequate facility for removing parts and also extending or reducing the number of channels in use.

Finally, an important basic requirement is that the instrument should be reasonably priced, but in this respect it is bad economics to force down the price of an instrument if this means that the saving of a few pounds in the initial capital cost loses potentially very many times this figure due to transient faults that may arise in years to come.

Two further points of a general nature that are relevant to the design of summators should be mentioned at this stage, the first is that the coincidence of signals from impulsing meters should not result in any loss in the summator, and secondly, that a supply failure should not destroy stored information.

Electrically Assisted Differential Summator

The simplest electronically assisted summator uses differential gearing for mechanical summation and is driven by solenoids. This summator has the primary advantage that impulses cannot be lost, and with the use of electronics there is the advantage that the power taken from the impulsing contacts to drive the solenoids is very low. A schematic of the summator is shown in Fig. 2.

The speed at which impulses can be received is limited only by the electro-mechanical drive units and, provided these are of the rotary type, the limit has no practical significance. The appearance of an eight-way differential summator is shown in Fig. 8.

The circuit diagram (Fig. 3) shows a transistor associated with each coil of the electro-mechanical system and a power pack of 16 V. When the base of a transistor is driven from the impulsing source, its associated solenoid operates.

The price of this type of meter is very competitive, and for the smaller consumer has everything to be said in its favour. It is speedy, it has check dials, and it makes no heavy demand on the impulsing circuits. The count is absolute and the meter has a permanent memory.

Electronic Summators

The next stage in the design of an electronic summator is the removal of gearing associated with the receiving elements. This involves the use of electronic stores and a scanning system so that information accepted from the impulsing source can be fed without overlap to a simple mechanical totaliser. A 4-6 channel electronic summator with the electronics mounted remote from the indicator is illustrated in Fig. 12. The indicator unit comprises a totaliser, m.d. dial and check registers.

The schematic diagram of a pure electronic summator (Fig. 4) shows the impulsing meters feeding storage units, scanning system and totaliser. With this arrangement, coincidence of impulsing signals does not result in lost

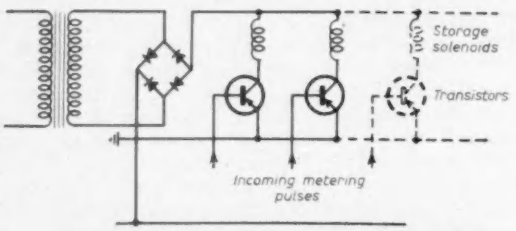


Fig. 3. Circuit diagram of the differential summator, type T2, used in the meter shown in Fig. 8. The transistors and solenoids operate from a 16 V d.c. power pack

information. The final stage totaliser and maximum demand indicator are the only mechanical features necessary to comply with the condition previously stated—that if a supply failure occurs, information should not be lost. In this respect it is also important that the time constant of the power pack is such that supply transients and very short term loss of supply should not cause information to be lost or spurious information added to the storage system. The drive for the totaliser is similar to the differential summator.

The totaliser section, Fig. 5(a), consists of a suitable power pack, transistor amplifier and electro-mechanical

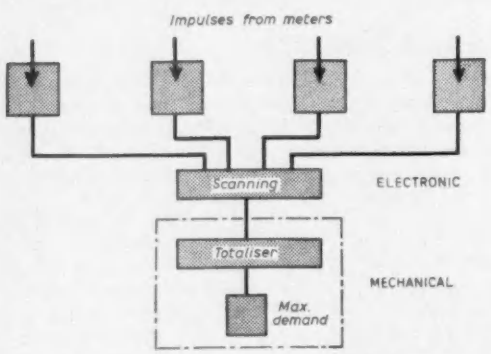


Fig. 4. Schematic of electronic summator

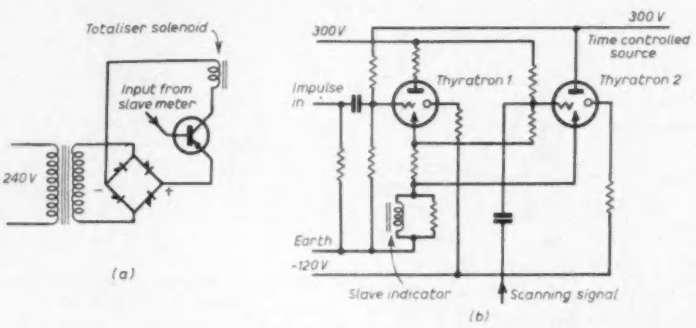


Fig. 5. (a) Circuit diagram of the totaliser. (b) circuit diagram of pulse storage unit

drive. When the base of the transistor is driven by a signal from the impulsing meter, the solenoid operates. This is the only electro-mechanical unit and is included, to store information through possible supply failures.

The incoming section of the electronic summator consists of the pulse storage unit which accepts information from the impulsing meter. It is a plug-in unit and contains two thyratrons with their associated resistors and capacitors. Fig. 14.

The anode of the first thyratron, Fig. 5(b), is supplied from a 300 V source, and its grid and the anode of the second thyratron are supplied from a limited 300 V source. That is, the supply is derived from a capacitor, so that when the capacitor discharges there is a definite dead period before the 300 V supply is available. The slave indicator is in the cathode circuit of the first thyratron, with a resistor shunt to damp back voltage. This arrangement provides a controlled dead period after information has been received and gives protection to the unit by making impossible the acceptance of other information, such as spurious signals from the impulsing meter circuit. The grid of the first thyratron is held at a value below ionisation level, and the grid of the second thyratron is connected to the cathode circuit of the first thyratron via an associated resistor network, so that under non-operating conditions it is held below ionisation level. The grid of the first thyratron is sensitive to an incoming voltage pulse, and when such a signal is received the tube ionises, raising the cathode potential which increases the voltage at the grid of the second tube, such that it is itself sensitive to a pulse that may arrive on its grid. The grid of the second tube is connected to the scanning system, and when a signal arrives, the stored information is released by means of the second tube, whose current path is via the cathode circuit of the first tube. This circuit shows a slave indicator included in the cathode circuit which registers the effective transference of an impulse.

Collapse of the voltage feeding the second thyratron causes it to extinguish and, at the same time, the cathode voltage of the first tube is raised sufficiently near to the anode voltage so that it, too, extinguishes. The pulse storage unit, having passed on this information, is delayed from being sensitive to further information by the time-controlled voltage source which supplies the grid of the first tube.

Scanner

The scanner takes the form of a ring circuit and is a means whereby impulses can be released from the pulse storage units in a controlled order and at a controlled speed. Release of the scanner is by a series of impulses which are fed to the appropriate storage units, permitting the stored information to pass to the totaliser in sequence. In a scanner of this type, each storage system has its own ring element, that is to say, a ten-way summator ring system will have ten thyratrons.

The circuit diagram (Fig. 7) shows that these tubes are fed from a stabilised d.c. source. The elements are identically connected, with their grids held at a voltage below ionisation level. In this steady state, none of the tubes will ionise and a starting arrangement is necessary in order that a ring action takes place. Once the ring is started, each tube will ionise in turn on receipt of a triggering signal and, due to the voltage drop across the common anode resistor, will extinguish its predecessor. The ionisation current that flows charges the shunt condenser in the cathode circuit, and as the grid of the following tube is connected via a resistor network to this point, its voltage is raised to a value just below ionisation level. In this condition it is ready to receive a triggering pulse. Once ionisation is started, and providing triggering pulses are available, a ring action will take place.

The triggering impulses are taken from a common source which is shown as a simple oscillator with its output connected to the grids of all the thyratrons. It is fed from a stable d.c. source and is resistor-capacity connected to its grid so that when the grid reaches a

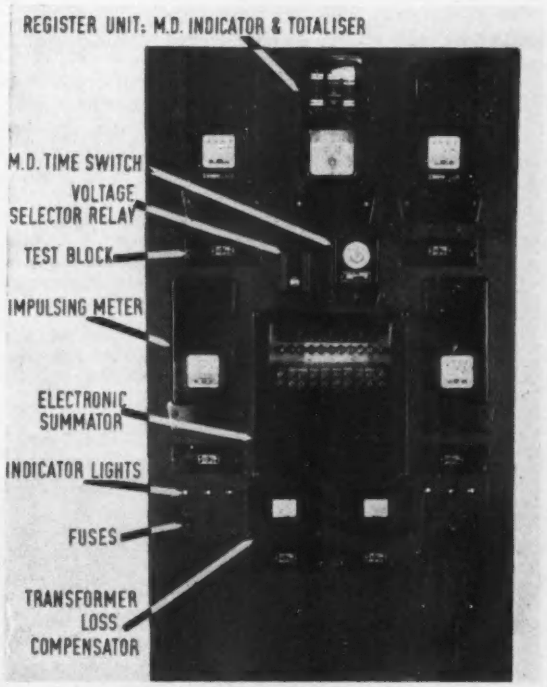


Fig. 6. Industrial electronic summation panel. The register unit consists of an m.d. indicator, totaliser and ten slave indicators recording incoming impulses from meters passing to the summator. A signal is injected into the low voltage meter to compensate for transformer iron and copper losses. The scheme has 10 MW capacity and each impulse represents 1 kWh, so that incremental accuracy is very high

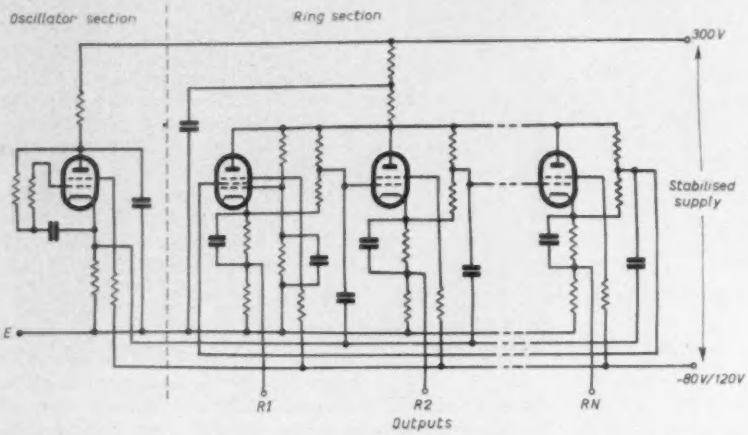


Fig. 7. Circuit diagram for the electronic summator scanning circuit

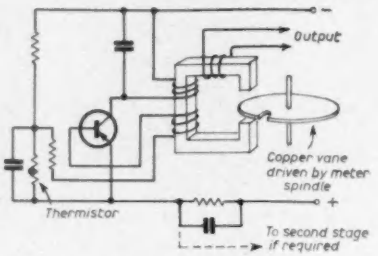


Fig. 9. Electronic contact for use as a proximity impulse source

certain critical voltage, the tube ionises and breaks down, in turn causing collapse of its anode voltage due to discharge of the anode capacitor. This action is repetitive and the output of regular impulses, whose frequency is controlled by the R/C condition of the circuit, is fed to all the grids of the thyratrons in the ring circuit. It will be seen that change of state of each thyratron makes available an outgoing impulse from the cathode, thus, sequentially, a series of impulses are fed from the ring circuit in a controlled manner to the stores which, in turn, release information to the totaliser. It also follows that, if no information has been stored, the scanning impulse has no effect on the totaliser. The method of starting the ring is either by an additional tube or, when available, a spare trigger electrode in one of the tubes.

The complete circuit for an electronic summator includes the pulse storage units associated with each meter, a scanner, a totaliser and the power supplies.

Use of Transistors

The use of transistors may be desirable to eliminate the need for a highly stable d.c. supply and to permit use of a lower voltage source.

Fig. 8. External view of 8-way differential summator with m.d. indicator totaliser and, below, the register units. Solenoids drive the m.d. indicator through differential gearing. Capacity is 2 MW operating in 1 kWh steps

The fundamental units of the transistorised system, differ little from those described. The pulse storage unit takes the form of a bistable circuit which consists of two cross-coupled transistors, Fig. 10.

In this circuit there are two stable states—the first when transistor 1 is fully conducting, and transistor 2 is cut-off and the second state when transistor 1 is cut-off and transistor 2 conducting. In the first case, a positive pulse on the base of the first transistor will tend to change the state of the transistor from conducting to cut-off. In this action the collector of transistor 1 will go negative and the base of transistor 2 will go negative, which forces the second transistor into conduction. During this action the collector of transistor 2 will go positive, and so will the base of transistor 1, thus cutting-off transistor 1. If the voltage gain from base to base is more than one, the loop can be made regenerative. Thus with an appropriate trigger pulse this circuit can be changed from one stable state to the other, and it follows that a complete cycle consists of two impulses, and during this complete cycle one pulse appears at each collector. In the transistorised summator the first transistor is coupled to the incoming impulses, and the second transistor is coupled to a scanner.

Transistorised Scanner

The use of transistors may be desirable to eliminate the being that which follows the thyratron type of ring circuit and uses transistors which have thyratron characteristics. These can be either of the avalanche type, a more highly developed type such as the "Thyristor," a 4-layer grid-controlled rectifier or the more recently developed "Binistor." The "Thyristor" is an interesting transistor which is similar to a conventional high speed transistor, except that there is a critical collector current above which breakdown occurs. At this point, the "Thyristor" regenerates and switches to a highly conductive, stable state. This transistor possesses characteristics which are similar to the conventional thyratron, as, once it is triggered, it will remain on, even though the triggering voltage is removed. It has, however, an advantage over the thyratron, for it can readily be turned off by applying a reverse triggering voltage to the base.

A more sophisticated four layer device is called the "Binistor."

The conventional three layer device is of p.n.p. construction. The emitter is of "p"-type material, and the majority of carriers are positive holes. In the reverse sandwich of n.p.n. construction, the emitter is of "n-"type material, and the majority of carriers are electrons which flow into base and collector.

Adding an additional layer of "p"-type material permits

an extra control, called an injector, which has the facility for holding the device in a conducting state, Fig. 11(a). A simple ring-circuit, Fig. 11(b), can be made up with this device, consisting of one "Binistor" for each way and a driving transistor stage.

If it is assumed that before the trigger pulse is applied, one stage is on and all other stages are off, then, when the transistor is switched on, injector current is diverted from the "on" "Binistor," so switching it off. The positive-going pulse at the collector of this stage is passed to the base of the next stage, which switches it on when the transistor is switched off—thus the "on" state has been passed along from one stage to the next, and this process is repeated through the ring. The outgoing pulse to scan the storage units is taken from the collectors of each of the "Binistors."

More economic methods use flip-flop circuits driven from an oscillator or impulse coupled rings. If the number of ways is not large and care is taken in design, it is possible to obtain a sequence of output pulses in a predetermined manner from either circuit.

The third, and preferred method, uses bistable circuits similar to the one described, connected in a ring.

Providing a suitable impulse is received from the oscillator, a condition exists where one bistable unit has a state different from the others, and it is possible to make this state progress from one to the next.

As with the previously described ring-circuit, it will be seen, Fig. 13, that as progression takes place an output pulse is available for each of the storage sections so that they, when scanned in sequence, will release any information that is available. The ring-circuit is driven from a multivibrator, essentially an oscillator which moves between two unstable states by means of positive feedback provided by capacity cross-coupling the collectors and bases of the transistors.

There is much merit in this type of equipment, as the bistable units used for storage purposes, and the bistable units used in the ring circuit are all identical, thus a summator can virtually be a "do it yourself" instrument.

Impulsing Source

The equipment described is capable of counting absolutely. There is, however, a vital link in the chain between summator, totaliser and impulsing meter. It is the impulsing source. This device is of major importance if absolute counting is to be achieved. Relying on two metals rubbing together to make and break a circuit has never been wholly satisfactory The assisted types which are now available, even though they are expensive, are not completely reliable.

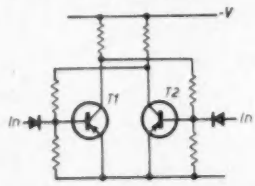


Fig. 10. Bistable circuit for pulse storage unit using cross-coupled transistors

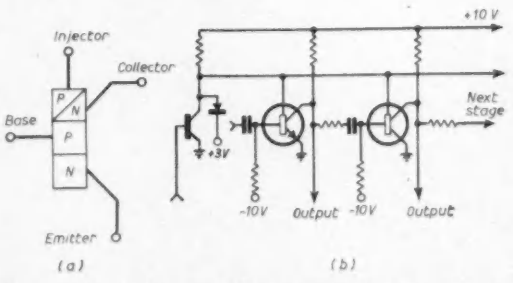


Fig. 11. (a) Circuit symbol for "Binistor." (b) Ring-circuit diagram using "Binistors" for a transistorised scanner

Fig. 12. Equipment for integrating four metering services. The register consists of m.d. indicator, totaliser and four slave registers. The electronic panel is shown above

A photoelectric device can be used, and is an improvement on mechanical systems, but it has disadvantages both as regards the source of illumination and the photo sensitive device.

The use of a beta source to give a signal will undoubtedly be used in the future. This device consists simply of a minute quantity of a suitable beta emitter such as strontium 90 which energises a single crystal of cadmium sulphide. It has many advantages, such as low impedance, and it is cheap to produce, but it has the disadvantages that the source is unseen and at present suitable crystals are not commercially available.

Proximity Impulse Source

The proximity device has at the present time many advantages. It consists essentially of a high frequency oscillator designed to give a signal when the capacitance or inductance of the system undergoes a change of state. Either system can be used in a single-stage transistor circuit and both have the advantages of low impedance, cheapness and reliability.

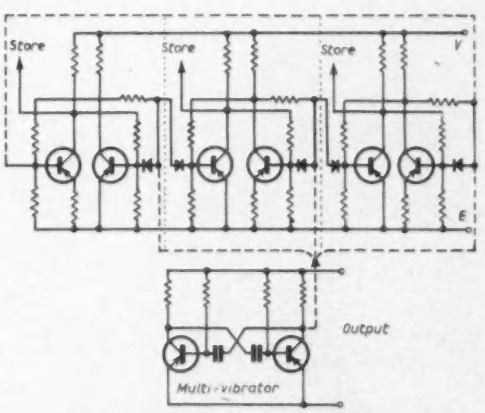


Fig. 13. Bistable ring-circuit using transistors

Electrical Impulse Sources

Type	Merits	Demerits
Mechanical	Reasonably priced Well understood	Friction high Failure rate high
Photoelectric	Cheap and miniature	Requires light source
Beta/Gamma detector	Cheap and miniature	Crystals not available Source unseen
Oscillator type	Cheap and miniature	

The oscillating circuit comprises a transistor and a gapped iron circuit which carries two windings, Fig. 9. A notched light copper vane is introduced in the iron circuit gap arranged so that when the vane is in the gap the normal oscillation is damped due to eddy current loss in the copper. When the vane notch is in the gap, the circuit oscillates freely. In this way a high frequency impulse can be generated which can then be demodulated to obtain a d.c. signal. The copper vane can be sufficiently small to be directly coupled to a meter spindle, or, alternatively, to the unit wheel on the counter.

One form of the contact has been mounted in an arrangement which suits a manufacturer's meter. The contact gives a single output pulse for each revolution or fraction of a revolution. There is no reasonable limit to the number of revolutions per impulse or impulses per revolution. If the number of impulses per revolution is high, say, 100, not only can the system be used for energy totalisation, it can also be used as a power flow indicator, and there is the further advantage that with a system employing two electronic contacts suitably phased the system can also indicate power flow direction.

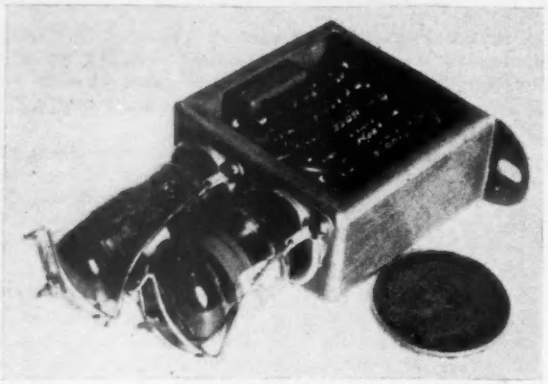
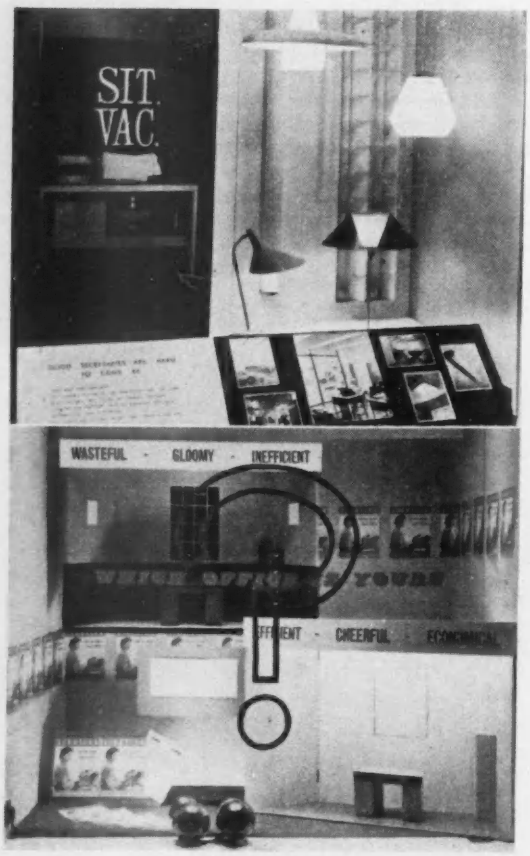


Fig. 14. Pulse storage unit

Drive for better Office Lighting



Suggested window displays on office lighting from BLC's autumn campaign

WITH the lighting season fast approaching, plans are already being made for sales campaigns and promotional literature. This year the British Lighting Council is taking its cue from the incidence of the new Offices Act, operative next January, which, among other factors, makes the provision of sufficient and suitable office lighting enforceable by law. What is "sufficient and suitable" is by no means clearly established as yet, but the recent IES Code gives some lead in recommending values from 30 to 45 lm/sq ft for working areas with a minimum of 15 lm/sq ft for reception and general areas. It has been said that many offices have levels below 10 lm/sq ft and, clearly, this impairs office efficiency, if nothing worse.

To start the drive for better office lighting, the Council has planned an Office Lighting Week from 23 October to 28 October; that is, the week following the end of Summertime. Some 60,000 leaflets, *Good Conditions Mean Good Lighting*, will be distributed to office users throughout the country by direct mail, partly by the Council and partly by the electricity boards. Others who wish to co-operate can obtain supplies of the leaflet at 15s per 100, or £7 per 1,000, post free. Other publications include a handbook, *Better Office Lighting*, for office managements, price 6s post free, and correspondence stickers at 3s per 100, 27s 6d per 1,000.

At the BLC Centre in Brettenham House, London, an exhibition of office lighting over the past century will open on 23 October and others are being planned for Birmingham, Bristol, Hull, Leeds and Sheffield. Additional features for the campaign are suggestions for window displays, demonstrations, conferences and lectures for office users and ideas for advertising in local papers for the trade.

Full details of the campaign and requests for assistance or advice can be obtained from the Council's headquarters at 16-18 Lancaster Place, London W.C.2, or from the BLC Regional Offices.

Hunterston vessel stress-relieved

DIGITAL READ-OUT AND 400 THERMOCOUPLES USED

AN outsize job in stress-relieving was successfully completed recently on the first of the two reactors at the Hunterston nuclear station. The station is under construction by the GEC—Simon-Carves Atomic Energy Group, who sub-contracted the pressure vessel to the Motherwell Bridge and Engineering Co. The design and installation of the stress-relieving plant was conceived by the Industrial Advisory Service of the South of Scotland Electricity Board.

Hunterston will have twin reactors with spherical pressure vessels 70 ft diameter operating on a CO_2 cycle with natural uranium fuel. The station has a designed electrical output of 150 MW/reactor and the first reactor is scheduled for operation in December this year. Altogether, the pressure vessel contains about 1,800 tons of steel at a mean height of 85 ft above ground level. Inside the pressure vessel and undergoing stress-relieving at the same time were the inner heat shield, the graphite core support grid and the main gas seals between the walls of the inner heat shield and the pressure vessel. Part of the hot and cold gas ducting, nozzles for the charge/discharge machine and control rod standpipes were also included. In addition, the steel restraint beams for the graphite core were suspended from the inner shell nozzles and other items were laid on top of the grid cover plate.

Stress-relieving

Stress-relieving entailed raising the vessel and its contents to 550°C. As this was the first time that such a large vessel had been heated in this way, the rate of temperature rise for the vessel was restricted to 5°C/hr. On this basis, it took nearly seven days for the vessel to attain the final temperature. It was then left to soak for 12 hr and subsequently allowed to cool slowly over a further nine days before the thermal insulation was removed. Entry to the vessel was delayed for another two days.

Temperature Control

Features of the operation were the size of the electrical stress-relieving load, which attained 3·6 MW on occasions, and the elaborate methods used to measure and control the temperatures in different parts of the pressure vessels during the whole of the stress-relieving period. For heating purposes, the vessel was divided into 40 separate zones with separate control. Temperatures were monitored by over 400 thermocouples placed not only in the positions of the permanent thermocouples to be used when the reactor is in operation but also in supplementary positions. The temperatures were recorded by two methods, digital typewriters were used for about 300 of the readings and six strip chart recorders for the remaining 100. By using two systems it was reasonably safe to assume that stress-relieving could continue under control if either the typewriter control or the chart recorders should fail. Also, the strip chart recorders were more easily interpreted than the digital typewriter readings.

As the readings were taken from the recorders they were plotted as a graph on a special pegboard in the control room. On this board, temperatures were plotted horizontally in 5°C steps and the 100 thermocouples were plotted vertically. In this way, an overall picture of the heating pattern of the reactor vessel was available to the controller.

Used in conjunction with this pegboard were two models, one of the pressure vessel and the other of the

Fig. 1. A graphic picture of temperature variations as stress-relieving progressed on the Hunterston pressure vessel was given by this pegboard. Temperature was plotted against thermocouple number

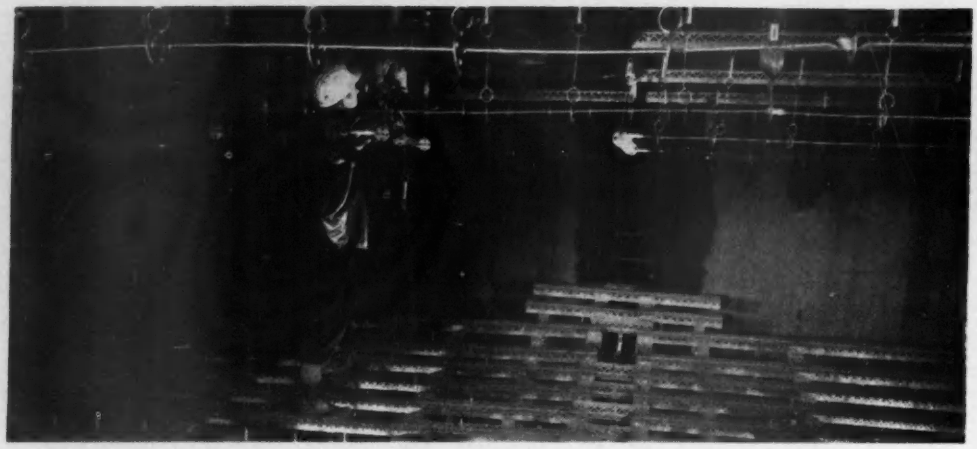


Fig. 2. Installing the electric heating strips under the core supporting grid. The men are standing on a slotted framework used to support the heaters for the bottom of the vessel

inner heat shield resting on the grid. Lamps attached to these models corresponded to positions of the 100 thermocouples on the reactor vessel and indicated on the pegboard graph. If a thermocouple temperature, as recorded on the pegboard, showed signs of changing unexpectedly, a small plug could be placed in the thermocouple position on the board and this lit a lamp on the model. In this way, the position of the unexpected temperature change was immediately clear and remedial action could be taken by the controller.

Forming part of the pegboard were two other displays, one of the power loading of each heating circuit and the tap positions of the load-heating control transformers and the other showing the cycling of the duct heaters.

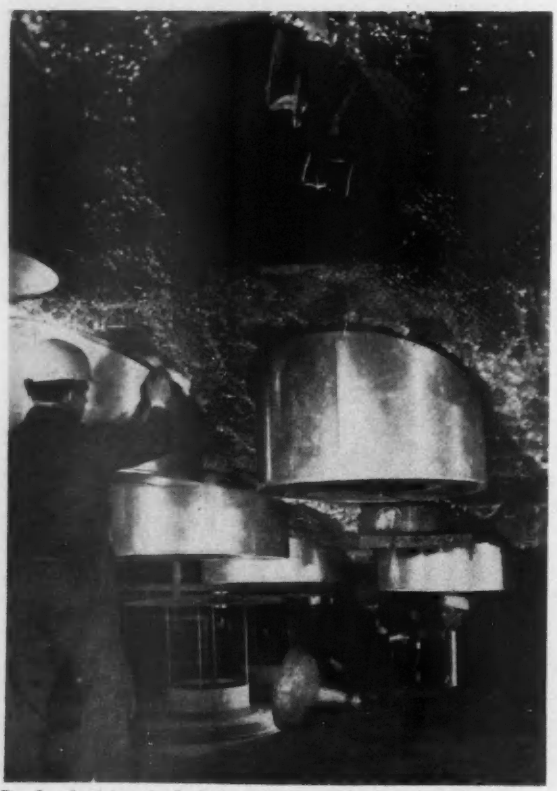


Fig. 3. Applying the Rocksil insulation to the bottom of the pressure vessel. Charge nozzles were insulated individually and then covered with aluminium foil

For digital display, GEC developed equipment specially. On automatic operation, all thermocouples were sequentially scanned and printed their reading out on an electric typewriter with provision to select a particular thermocouple if required. Manual operation, using a push-button, also enabled the control engineer to select and log individual thermocouple readings. The logging equipment comprised four uniselectors with gold-plated contacts driven by relays, electrically interlocked with the indicator and print-out system, to control the logging sequence. Each uniselector output was taken to a potentiometric indicator with a balancing time of 1 sec, but provision was made to reduce this time if successive temperatures were similar.

Thermocouple Position

The thermocouples used were of chrome-alumel. Their position on the pressure vessel support skirt was given particular attention to enable temperature distribution down it and along various planes around its periphery to be controlled. The temperature along the gas ducts was also measured at several points to ensure that large gradients did not occur. One pair of thermocouples was connected differentially to measure temperature difference between the bottom and top of the reactor pressure vessel to enable the controller to maintain an even temperature distribution throughout.

Power for the stress-relieving operation was obtained from the SSEB system through four 1 MVA, 11 kV, 415 V, three-phase transformers. These, in turn, fed 24, 150 kVA auto-transformers, two per phase in parallel, with ten equal steps of on-load tap changing. Switching was provided to enable these transformer taps to be switched cyclically if the lowest tapping had proved too high for the temperature required at any given time. Connections were taken directly to the heaters by stainless steel rods and these were welded to the heating elements to obviate any danger of bad connections developing during the stress-relieving operation.

The heating element design entailed several considerations. Radiant heating was considered essential to ensure uniform heating and it was decided to employ uninsulated Brightray strips in all locations except the ducts. These were hung between the pressure vessel and inner container, rather like curtains, using Inconel wire supports attached to ceramic insulators. The strips were dimensioned so that their length was 100 ft, corresponding to half the sphere circumference. In this way it was possible to bring the line connection out at one side of the vessel and the neutral at the other.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Representatives Call

I HAVE read two letters on your Readers' Views page on the subject of representatives call. Having acted as a wholesaler's representative for approximately 15 years prior to 1940, and for the last 15 years having been on the other side of the fence, buying and also managing the indoor side, I feel it would be quite a good idea if all buyers, before taking up their appointments, served an apprenticeship as a representative.

A. D. Culling,
BEXLEYHEATH, KENT.

Aluminium Cable Prices

IN your 13 July issue I quoted a figure of £100,000 as the annual saving through the use of aluminium cables by one area board. The purpose was to point out that, in fact, aluminium cables are in greater use than is often realised.

Mr C. C. Barnes questions whether this is a typical figure. I think it is, as it referred to the calendar year 1958 and undoubtedly it was a convenient round figure well below the actual saving. I must point out, however, that it was not achieved in a year when the price of copper was very high—quite the contrary, the lowest prices of copper were achieved during that year and the average price (the simple average of the official monthly figures) was £198/ton. During 1959 and 1960 the price was £238/ton and £246/ton. Throughout this time the price of aluminium has been £180/ton to £186/ton.

From the published annual reports of the board it seems that a greater total length of cable was laid in 1959 and 1960 as compared with 1958 and it, therefore, seems reasonable to assume that the price saving was, in fact, appreciably higher in those years than the £100,000 referred to in 1958.

There are, of course, other area boards and other users of aluminium cable who are saving sufficient money to justify the changeover they have made to aluminium conductor cables.

The actual price saving nowadays seems on average to be about 4% but, in fact, a very common comparison is between an 0·3 sq in. aluminium cable and an 0·2 sq in. copper cable and here the price difference is about 10%.

The present indications are that the Solidal cable offers greater price savings throughout the range and the attached schedule, which shows the price of Solidal cable expressed as a percentage of the price of copper cable of the nearest equivalent size, will, no doubt, be found of interest. In order to achieve the savings shown in the right-hand column it is necessary to appreciate that an alternative system of earthing must be adopted. Three area boards have already done this. Elsewhere, a change to Solidal cable with no change in the number of cores has shown a slightly lower, but still appreciable, saving.

A. G. Thomas,
SALES DEVELOPMENT DIVISION,
ALCAN INDUSTRIES LIMITED.

Prices of Solidal cables as percentage of equivalent copper cables

Solidal: P.V.C. insulated, aluminium armour wires or strips of the same total resistance as one core, aluminium foil current-equalising tape, barium chromate inhibitor tape, p.v.c. sheathed—1·1 kV.

Copper: (a) P.I.L.S.S.W.A.—1·1 kV.
(b) Plastic insulated, plastic bedded, s.w.a. and p.v.c. sheathed—1·1 kV.
Basis: Copper wire bar £220/ton. Aluminium ingot £186/ton.

Cable Size		Price of Solidal per cent of copper cable price				
		3-core cables:		*4-core cables:*		*3-core Solidal (Armour as neutral) /4-core*
Copper sq in.	Solidal sq in.	Copper (a) %	Copper (b) %	Copper (a) %	Copper (b) %	Copper (a) %
0·04	0·06	91	90	84	82	70
0·06	0·10	92	91	89	88	75
0·10	0·15	88	85	83	80	68
0·15	0·25	94	90	86	82	71
0·20	0·30	85	75	82	77	66
0·25	0·40	90	83	85	79	69
0·30	0·50	93	86	80	75	72

Water-heating Bills

MAY I venture a comment on the Electrical Development Association's letter in your issue of 10 August last? It is that most households rely on heat escaping from the hot-water tank for their airing cupboard, so that the perfect lagging of the tank, which alone would justify Mr Honey's contention, is not, in fact, attractive to the bulk of users. A time switch then indeed represents an economy.

Roy H. Lancaster, M.S.M.A.,
MARKETING MANAGER, ROGERSON PAGE LTD.,
WOKING.

* * *

WHILE I cannot disagree with P. Honey's view that proper lagging of a water-heating installation is the correct approach and is normally the cheapest means of keeping costs to a minimum, I think that there are instances where time-switch control may be worth while.

There must be many cases similar to some I have encountered where the hot tank, in an existing installation, is fitted close to the two corner walls of an airing cupboard, making it impossible for lagging to be fitted all round the tank without expensive alterations. In such cases a time-switch set to limit the switch-on periods of the immersion heater will afford greater convenience than the alternative necessity of hand switching. The time-switch may be set to provide sufficient hot water for the householder's requirements early in the morning, after lunch and during the evening. It is necessary for the immersion heater to be fixed vertically into the top of the tank, so that hot water is quickly available for draw-off. The quantity of water available will then depend on the length of time during which the heater is operated, and this can be adjusted to suit individual needs.

With many domestic floor-warming installations now being connected in new properties, consideration should be given to providing a water-heating system for "off-peak" operation. This can be done by ensuring that the hot water storage tank or cylinder is of adequate capacity

to carry over the peak periods, that it is well lagged and that the cold water feed is cut off during the periods when electricity is not available. An electromagnetic valve can be obtained to control the water flow into the tank, allowing it to enter only when the operating coil is energised by the supply.

The electrical consumption for water-heating and floor-warming, taken together, may well be sufficient to show a saving after allowing for the extra cost of control equipment if the supply is taken on the "off-peak" tariff.

H. H. Lawrence, A.M.I.E.E.
EASTBOURNE.

* * *

I WOULD agree with Mr Lancaster that many households rely on heat escaping from the hot-water tank to keep the airing cupboard warm, but it is not necessary to go without good lagging in order to get it.

My own combination cylinder/cistern unit at my home, which is electrically heated, is very effectively and completely lagged with a 1 in. thickness of glass fibre, yet the small heat loss from the unit is quite enough to keep the airing cupboard at a temperature which airs all the clothes and linen normally stored in it. Only a few degrees rise above the ambient temperature is enough for this purpose.

There seems to be a mistaken idea that an airing cupboard must be warm or even hot to enable it to air linen. I suggest Mr Lancaster tries out a few experiments with a low wattage tubular heater which equals the heat loss from a well-lagged tank or cylinder.

Turning to Mr H. H. Lawrence's letter, I support his view that there are instances where time-switch control is worth while for an immersion heater installation. If a tank cannot be lagged properly, a time-switch can help to reduce costs, particularly if its on-and-off switching periods can be timed to anticipate both the busy and slack periods of hot water demand in the household.

Much will depend upon the actual rate of heat loss of the storage vessel. If a time switch turns off a fully heated tank full of water at, say, 11 p.m. and turns it on again at 6 a.m., the first hour or two will be spent in making good heat losses which have taken place during the night. The better the lagging the lower these will be. If the lagging is adequate and there is no fortuitous external circulation of electrically heated water, the consumption of electricity will be very little more if the immersion heater is left switched on all night. If when the current is cut off all the hot water has been used, there will be no heat losses during the slack period and a time switch can then effect a saving in overall consumption. Nevertheless, the family has to adapt their habits to the pre-arranged setting of the time switch, but this does not give the flexibility which they are entitled to expect.

I was glad to see Mr Lawrence's remarks on off-peak water heating in which the time-switch restricts consumption mainly to the night hours. There is considerable scope for this method of water heating, particularly when the off-peak supply is available from 7 p.m. to 7 a.m. In most cases a 30 gal. storage vessel is more than sufficient to supply all the hot water required during the day. Between 7 p.m. and 11 p.m. a 3 kW heater can provide three good hot baths and there is ample time during the rest of the night to bring the whole of the 30 gal. up to 140°F/160°F.

Philip Honey,
2 SAVOY HILL, W.C.2.

Off-peak Heating

RECENT correspondence under the above heading serves to confirm the increasing interest in continuous space heating by methods which, though continuous, contribute very little to the "peak" due to the thermal carry-over of the rooms and the radiators.

Continuous electric space heating, whether by hot water radiators or oil-filled electric radiators, provides the supply authority with a large number of units used/kW installed without the disadvantages of storage systems—need for topping up—high distribution, cost, copper, etc.

The average units used with a radiator system due to its greater flexibility is approximately one-third less and the maximum demand at any one time is around 25% to 30% of the total installed load. This potential maximum demand can be further reduced by means of load controllers.

A. C. Hazel,
JOINT MANAGING DIRECTOR,
POWELL DUFFRYN HEATING LTD.

Spare-time Electricians

AS an electrical contractor who has experienced the menace of competing with the "spare-time" electrician, I was interested to read the comments by *Megohm* in your issue of 10 August. I and many other bona fide contractors share his concern at this growing trend, and something will certainly have to be done to stamp it out.

In the area of my firm's operations, one of the biggest problems is the work carried out by employees of the electricity board and this, of course, is a direct contravention of the terms of their employment.

A friend of mine (also a local contractor) had occasion to write to the electricity board recently over the case of a house rewired by two of their men on a "spare-time" basis at little more than half the normal costs. An official of the board sent a letter of acknowledgment and stated in his reply that the electricians' attention would be drawn to the terms of their engagement, but no further investigation was, apparently, carried out. At one time (and I know this as an ex-employee of the electricity board myself) there would have been an immediate inquiry and the men concerned would have been instantly dismissed.

Such action always had the desired effect, but in these days it may well be that the board also have their labour problems and have to turn a "blind eye."

The contractors in this area (and I expect we are not alone) also have to contend with the wholesaler who is willing to supply these "spare timers" with materials at full trade terms. I have already protested to a wholesaler locally concerned and, having proof that he still continues this practice, have closed my firm's account.

Summing up this problem, it would seem that the most effective steps contractors could take would be (a) to report the "spare timers" to their day-time employers; (b) bring pressure to bear on wholesalers found supplying these people with materials; and (c) by expressing their concern to the local electricity board.

In closing, and whilst writing about electricity boards, I am sure all contractors and retailers are agreed that it is high time they gave up contracting work and the sale of appliances, both of which they are able to subsidise by the sale of current, and confine their activities to the supplying of current at the most economical price.

L. W. Jones,
L. W. JONES AND CO. LTD.,
KENTON.

NOTES ON WIRING

BY MEGOHM

I APPEAR to have trodden on a hornet's nest by mentioning the activities of "the spare-time electrician." The hornets in this instance, however, are quite friendly towards me, but are quite the reverse to these gentlemen who work in the evenings after a hard (?) day's labour with their official employer. I have received a few letters on the matter which, to say the least, rather startled me. One of the letters was of the "annonymus" type, and the reasons given by the writer for withholding his name and address appeared to me to be genuine, otherwise I might have ignored it. This particular letter alleges that 80% of the domestic installations being connected in the area *from whence the letter came* were being carried out by such spare-time electricians, many of whom are employed by the local electricity board. The writer of the letter has actually had to deal with these installations, and I feel that he, or she, might become most unpopular in the area if full details had been given in the letter.

I repeat, I might well have ignored this particular letter, but within a couple of days another letter arrived from a completely different area making similar allegations. This letter, however, was written on the business paper of an electrical contractor. It would appear from the writer that the local electricity authorities turn a blind eye to these goings-on. At one time any employee of the local board carrying out such spare-time work would risk instant dismissal. This particular contractor took the matter further by pointing out that local wholesalers are quite willing to supply these "spare-timers" with materials at full trade terms. He has taken action against one such wholesaler and closed his firm's account with that wholesaler.

From the contents of these letters it would appear that this spare-time contracting is a bigger menace than one thinks. I appreciate that these installations may be, and should be, carried out in a satisfactory way, but this type of thing should be stamped out, and I feel certain that many more contractors will back me up on this.

Everlasting Fuse?

This appears to be my week for receiving letters. A very good friend of mine, a director of a well-known accessories manufacturer, sent me a copy of a letter received at his office recently. The writer lives in a large housing estate where the houses are fitted with fused plugs and the cost of buying new fuses proved rather too much for him. He, therefore, experimented by wrapping the blown cartridge with silver paper, thus providing himself with a fuse "which will last for ever." The inventor considered letting the world benefit from his idea, but before doing so through the pages of the popular Press, wrote to my friend to find out if this idea would affect his sale of fuses! My friend wrote to the person concerned putting the matter of safety, etc., to him in such a way that left no doubt about this discovery being a danger. This seems to be a new twist on the conventional hairpin in rewirable fuses. Ironically, in more ways than one, the letter came from Scotland!

Garden Electrics

Are we, in the near future, going to see many more gardens illuminated at night? There appears to be some interest among householders in this sphere and I saw some new garden lighting fittings recently that even set me thinking about it. The manufacturer of these fittings has already established his products in the field of floodlighting, and these new fittings are of the usual high standard. One fitting is of the monkscap style, 24 in. in diameter, and with three lamps. This fitting is arranged for mounting to a ¾ in. conduit and available in four colours.

Illumination is only one part that electricity can play around the garden. A recent article in the ELECTRICAL TIMES described suitable wiring for the use of garden implements, and I feel that this trend will continue and grow. Many people today think along the lines that gardening would be much more enjoyable and interesting if the hard work was eliminated. In my view, the garden is becoming a showpiece rather than a place where hard work produced results which were the delight of the person involved.

Some engineers view this trend to electrify the garden with concern, and, in some ways, I agree with them. The greatest care must be shown when laying cables for outlets around the garden because of the chemical action of present-day fertilisers. One fear, which we must all share, is the possibility of the unskilled man attempting to arrange lighting and outlets around his garden. The garden is normally the playground of the children—often to the annoyance of the proud gardener—and we are all well aware of the inquisitive ways of the young child. Here is another case where the natural instinct of the engineer may well lead to a little ill-feeling by commenting, if necessary, on any wiring in the garden. It is well worth it, believe me. Quite recently I saw a housewife pegging clothes on to a p.v.c.-sheathed cable which was serving the garage some little way from the house. I commented on this to her, but got little satisfaction, and, in fact, received a silent rebuff when she calmly placed the usual clothes-prop into position and hoisted the clothes on high. A "friend" had put the cable up and this procedure had been going on for some months—so far without accident.

I wonder if, in the future, planners will think of these matters when designing houses. One immediate thing comes to my mind and that is the need to stop the builder from dumping all his unwanted materials and rubbish in the area where the garden will eventually be. I am constantly amazed at the stuff which is left behind. It appears that to purchase extra bricks for some job or other is rather costly, yet one can usually dig up dozens of bricks around a newly built house. Just over two years ago, whilst tackling the job of putting the "garden" into shape, I dug up a consumer's unit in its original package. It was damaged beyond use, naturally, but the cost must have been placed against the electrical contractor's charges on the job, and shown as a "loss."

On the Fringe of Colour

RADIO INDUSTRY DEMONSTRATES 625-LINE AND COLOUR SYSTEMS AT 28TH SHOW

Four of the new transistorised portables: (1) Decca "Debonette"; (2) Cossor CR1302T; (3) Sobell "Traveller"; (4) McMichael "Personal"

THERE is an atmosphere of expectancy about this year's Radio Show, which opened at Earls Court yesterday. While nothing outstandingly new is to be seen on the stands—that is, comparable to the wide angle tubes of 1959 or the change from 17 in. and 21 in. to 19 in. and 23 in. of last year—there is an evident preoccupation with the future as it may be affected by the decisions of the Pilkington Committee.

Are we to have colour? Will it be on 405 or 625 lines? Or are we to change our existing monochromatic TV system to 625 lines and leave colour over for yet a few more years? Nobody seems to know, but the industry is obviously getting on its toes, ready for whatever may happen.

Events of the last two years have clearly shown that, entirely apart from credit squeezes, home radio and TV markets are now close to saturation. For the future, production will have to be geared down to the smaller but quite appreciable requirements of the replacement market and population increases. And there are always the export markets which are nowhere nearing saturation. To compete here, though, there will have to be drastic revisions of manufacturing techniques and some collapsing of production itself if we are to achieve success against the highly geared industry of the USA and the rising outputs from Japan, Germany or even behind the Iron Curtain.

The British industry is not blind to the position. Though 27 of the more established names in television receivers are still to be found in the exhibition, only six remain independent, the remainder having been absorbed in one or other of five main groups. As a result, receivers bearing different names are already being manufactured on the same production lines—in many cases only differing in the casework—and the consolidation is by no means complete. Of course, there will always be the small independent concern content to limit its output to a few thousand receivers a year, or the even smaller speciality producer making high-class receivers in expensive period furniture for the wealthy connoisseur.

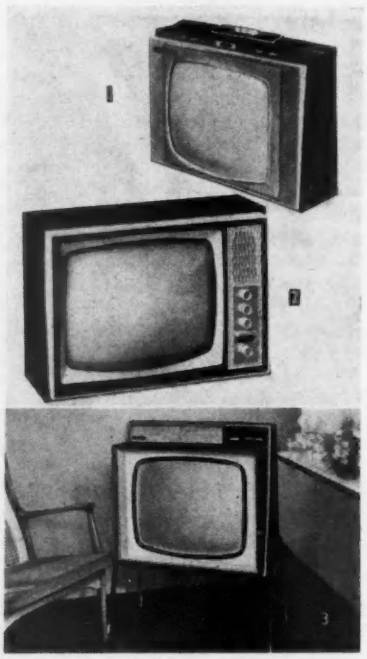
Television Receivers

For the most part television receivers, in the now standard 19 in. and 23 in. sizes, are little changed from last year's models but, as a concession to prevailing uncertainty about the future, most are already incorporating changeover connections, plug-in points or switches for line standard changes, if they should come, in a manner reminiscent of the days immediately before the introduction of commercial transmissions on Channel 9. The conversion units themselves are not yet available (perhaps not even designed), but the facility is there. The enthusiast hoping to get freak reception from the 625-line French transmissions will, therefore, still have to depend on the Eurovision link and BBC frequency-changing equipment.

"Gimmickry," too, is remarkably absent. If one excepts the remote control by ultrasonic waves from Dynatron on their Planet range of receivers, the "Space Director RC3," or the Philco "Selecta-flash" and the Ekco "Magic Ray" station-change systems, in which two light-sensitive ports are activated by the beam of an ordinary hand torch to change channel or sound volume, there is nothing which could be considered as out of the ordinary. Several sets incorporate wired remote control which, naturally, involves some degree of motorised tuning in the set itself.

Line and Colour Systems

On the subject of line systems, Pye, of course, are out-and-out in favour of an early change to 625 lines, regardless of whether colour comes or not. It is their contention that such a move would help us in the export markets. But would it not also open our home markets, the backbone of British receiver production, to a flood of standard 625-line sets from abroad? Other manufacturers appear to be preserving an open mind.



From the range of television receivers, top to bottom, the Sobell 19 in. "Luxury Landscape," the Philips 19 in. Andes version of 19TG111A and the Ferguson 23 in. 707T. The last two models have remote control as an optional extra

As to colour, there is the beginnings of an attempt to sound—or even condition—public opinion by the presentation of colour TV demonstrations on closed circuits. One of these, using a Marconi camera and three 21 in. monitor receivers, is demonstrating the NTSC system each day from 11 a.m. to 9.45 p.m. at Earls Court on the West Brompton side of the balcony. Three monochrome receivers alongside the colour ones, and receiving the same signals, demonstrate the compatibility of the system.

The GEC group—GEC, McMichael and Sobell—are not at Earls Court this year, but are presenting a show of their own at the New Horticultural Hall, Greycoat St, near Victoria, each day from 10.30 a.m. to 9 p.m., where admission is free. Here the main exhibits are demonstration of colour TV on two systems, the NTSC—a British adaptation of the system advocated by the National Television System Committee in the USA, and now in service both there and in Japan—and SECAM

(Sequential and Memory) a recently developed French system for which GEC holds a license. Here also are shown 405 and 625 systems together, so that the viewer can form his own opinions as to the merits of a change.

The big problem of colour as far as the viewer is concerned, is the high cost of the receiver and the three-gun shadow-mask tube, with its million-odd phosphor dots and metal screen pierced with 357,000 holes, is an expensive item which hoists the price of the receiver considerably. But we hear that, in the next ten days, Sylvania-Thorn will be making an announcement on their latest developments in this field.

Radiograms and Radio Receivers

Nor is there much which can be called new among the radiograms and mains receivers. Apart from a few variants in design, sets seem to have settled down into a general pattern of well-designed receivers, and amplifiers in cabinets to suit tastes of all kinds. "Hi-fi" and "Stereophonic" have now faded into the limbo of accepted words to describe contemporary performance and are no longer brandished as the outward sign of revolutionary achievement.

The number of portable transistorised receivers has increased enormously and the range of patterns from every maker is quite considerable. The conventional valve-type is practically non-existent this year. Pye make the amazing statement that, in the USA, 179 million portables have been sold, or one to every person in the population; in Britain the figure is only one per 250 persons.

Most makers have taken the hint from complaints about radios spoiling the peace of our countryside and quite a number of receivers are being provided with tiny earphones for the exclusive listening of the owner. Some of the table models are elegant and the quality of reproduction from the substantial speakers beyond reproach. But the output is still measured in milliwatts, as against watts from the larger radios and radiograms. Perhaps this could be a field for future development.

Accessories

The Radio Show is intentionally planned for the listener or viewer to see the best that the industry can offer and also for the radio retailer to meet his opposite numbers and discuss problems of the day. It follows that component manufacturers, though present in small numbers, are concentrating their efforts to the Radio Component Manufacturers' own exhibition earlier in the year. There are, however, some who are showing instruments of interest to the service engineer.

Tape recorders and public address amplifiers are also to be seen with few new models and nothing that can be called outstanding or revolutionary.

Among those who are entering this field for the first time are Philco, with their 25 gn model 5200, a twin-track recorder with a 2·5 W audio output; and Bush, with a particularly attractive four-track single-speed model, the TP.50.

An unusually interesting feature of the show is a panoramic display tracing the history of sound recording from 1888 to the present day, at which many vintage instruments will be seen. One of these is an early weight-driven acoustic recording machine; another is an Edison phonograph. It is a striking demonstration of the fantastic development of the acoustic and electro-acoustic arts over a period well within the living memory of many of us.

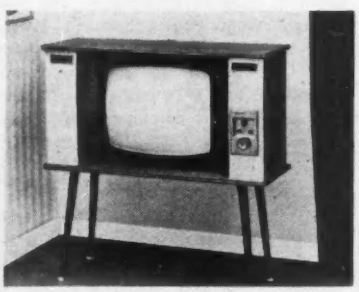
A few years ago, live broadcasts from the show were in the form of fully staged and illuminated entertainment from a temporary theatre. This year the practice of using the show mainly as a monitoring centre for programmes originating at the Lime Grove (BBC) and Foley St (ATV) studios, both as being radiated and "packaged" on tape, is being continued, with live broadcasts limited to interviews on the dais.

Above: a new tape recorder, the 18½ lb Philco 5200. Below: a compact club model reproducer, the AEI 71191

The GEC Group Show

The GEC group show at the Horticultural Hall, already mentioned, is not confined to radio and television receivers, but also covers a cross-section of the group's activities in other branches of the electronic field, ranging from the tiny thermoelectric refrigeration units to equipment for nuclear reactors, railway electrification and missiles.

Officially opened on Saturday last by Sir Miles Thomas, who paid tribute to the efforts of the company, both in the development of radio and television and in the wider electrical fields, over the past 75 years, by Sunday evening more than 35,000 visitors had passed through the gates and turnstiles. Could it be that here is a pointer for radio shows of the future?



Above, left: Decca's Model 777 combining radio, gram and 19 in. television receiver. Right: the Philco "Selectaflash," receiver with remote control by torch flashlight

Left: the GEC model BC 405 stereogram in sapele veneer cabinet. Right: the Ferguson 661R6 has headphones for private listening

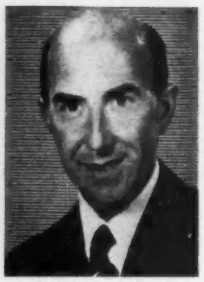
Personalities *in the industry*

Mr J. H. R. Hill

Mr J. R. Beard

Mr L. F. Wescott

Mr A. Young



Mr L. Phillips

At present a technical officer in the Chief Engineer's Department at Lesco Hse, **Mr J. H. R. Hill,** M.I.E.E., has been promoted to assistant chief engineer (operations) of the London Electricity Board, in succession to **Mr A. Hart,** M.I.E.E., who is to retire on 6 Oct. (*ESH, page 77). After early training at Faraday Hse and practical experience with J. A. Prestwich, Everett Edgcumbe, and the Charing Cross Electricity Supply Co., he was with the London Electric Supply Corporation, during which time he gained unique experience on standardisation of 85-cycle and 25-cycle systems. After vesting day he became senior assistant engineer in the LEB's Southern sub-area and, in 1949, was appointed technical officer in the Chief Engineer's Dept., receiving successive promotions to his present position as head of the HV/LV Design Section. In 1957, Mr Hill spent two months in America studying the organisation of the Detroit Edison Co. and the Consumers Power Co. in Michigan. He is also a past-chairman of the Chief Technical Assistants' Association.

Merz and McLellan announce that **Mr James R. Beard,** C.B.E., M.I.C.E., HON. M.I.E.E., FEL.A.I.E.E., will be retiring from the partnership on 31 Dec. next, but has agreed to continue his association with the firm as a consultant. From 1 Jan., 1962, **Mr Alan E. Powell,** M.I.C.E., M.I.MECH.E., will act as senior partner and will normally be based on their Esher office. Mr Beard's early training was with that nursery of great electrical engineers, the North Eastern Electric Supply Co., and he was also with the Cleveland and Durham Electric Power Co. before joining Merz and McLellan. He was closely associated with the design and construction of the national grid system and the Scottish hydro-electric projects, in addition to numerous overseas power schemes. He is currently president of the ERA and has held many other offices with various societies—he was president of the IEE in 1940-41, president of the BEPC in 1953-54, chairman of the Association of Consulting Engineers in 1945-46, and president of the ASEE in 1937-39. From 1941 to 1945 he was a member of the Engineering Advisory Committee of the War Cabinet and from 1947 to 1949 he was chairman of the Council for Codes of Practice for Building Construction and Engineering Services. Mr Powell, who has been a partner in the firm of Merz and McLellan since 1952, has specialised in the design of power station plant of large capacity at high steam pressures and temperatures. Educated at Peter Symonds School, Winchester, and University College, Southampton, he gained early training with John I. Thorneycroft and Co. before joining Merz and McLellan in 1924 as an assistant engineer. He was appointed head of the General Engineering Department in 1938 and chief mechanical engineer in 1945.

We hear from Ottermill Switchgear Ltd. of two recent appointments to the board of directors. They are **Mr L. F. Wescott,** ASSOCIATE I.E.E., and **Mr A. Young.** Mr Wescott, who is also a member of the ASEE, joined the company from the Admiralty in March, 1949, as an outside sales engineer and was promoted to sales manager in April, 1955. Mr Young has been with the organisation since 1929, and was appointed chief estimator in 1935. He became assistant works manager in 1940 and was promoted to works manager in 1949.

Following a recent illness, **Mr D. R. Mackie,** at his own request, has resigned from his position as managing director of Monsanto Chemicals Ltd. with effect from 1 Oct. He continues as a member of the board. Mr Mackie will be succeeded as managing director by **Mr John C. Garrels, jnr.,** deputy managing director, who has been actively carrying out the duties of managing director since Mr Mackie's illness in March. Mr Garrels joined Monsanto Chemicals Ltd. from the Plastics Division of its American parent company at the beginning of 1961.

Mr A. Bruce Robertson has been appointed chairman of the British Columbia Power Corporation Ltd., in succession to the late Dr A. E. Grauer.

Ekco Heating and Electrical Ltd. announce the appointment of **Mr A. C. Henderson** as Ekco "Warm-Glow" electric blanket sales representative, covering the London area south of the Thames. **Mr G. W. T. Goodhew** has also joined the company as sales representative covering Central London and the West End.

The British Central Electrical Co. Ltd. announce the appointment of **Mr P. A. Smith** as technical representative in the North London and Home Counties area.

A senior assistant commercial engineer in the Essex sub-area of the Eastern Electricity Board since 1958, **Mr Llewelyn Phillips,** A.M.I.E.E., has been appointed to succeed **Mr W. E. Wardrop,** ASSOCIATE I.E.E., as the Essex sub-area commercial officer when the latter retires at the end of December next (*ESH, page 107). Educated at Brandesbury College and Faraday Hse, Mr Phillips gained early mechanical experience with Broom and Wade Ltd. and, following two years as a technical assistant with the LMS Railway, he joined Edmundsons Electricity Corporation, with whom he held posts as assistant control engineer and assistant manager in Norfolk. He also

**Denotes revision to the "Electricity Supply Handbook, 1961."*

served as technical assistant to the managing director of Edmundsons Eastern group of companies and as resident manager of the Braintree district of the East Anglian Electricity Supply Co. Ltd. Following nationalisation, Mr Phillips held posts in the North Essex district and at area headquarters. In 1956 he was appointed senior assistant engineer in the commercial department of the Merseyside and North Wales Electricity Board. Returning to East Anglia in 1958, he obtained a similar position in the Essex sub-area headquarters. Mr Phillips served on the No. 1 Study Group, which considered "The Future of Service Centres," and was chairman of the panel for the implementation of the O. and M. report on paperwork in the showrooms. He has also attended a number of courses on management and human relations subjects held at Roffey Park and Horsley Towers.

District commercial engineer at Oldham to the North Western Electricity Board since 1949, **Mr R. J. Dixon,** M.I.E.E., has retired. Prior to 1949 he served at Ashton-under-Lyne for 26 years (*ESH, page 158).

Belling and Lee Ltd. inform us that **Mr Brian M. Lee,** director and manager of the Industrial Division, is now the company's assistant general manager. **Mr J. W. F. Golley,** the general works manager, is now works director, and **Mr J. F. Turrill** has joined the company as sales manager for both the Domestic and Industrial Divisions. Mr Turrill was previously technical sales manager with Ultra Electric Ltd., and was earlier with R. B. Pullin and Co. Ltd., where he became commercial manager.

The BBC announces the appointment of **Mr A. H. Hill,** M.A., as engineer-in-charge (television), Birmingham, in succession to **Mr J. D. MacEwan,** B.SC., A.M.I.E.E., A.M.BRIT.I.R.E., who has been appointed regional engineer, Northern Ireland.

Mr H. G. Campbell, T.D., M.A., A.M.I.MECH.E., A.M.I.E.E., F.I.E.S., has been elected chairman of Benjamin Electric Ltd. in succession to the late Mr A. E. Iliffe. Mr Campbell also continues as managing director, a position he has held since 1948.

Mr F. K. Chorley A.M.I.E.E., has been appointed chief engineer of Epsylon Laboratories Ltd. He joined that company last year from the Plessey-owned Cottage Laboratories Ltd., where he was deputy chief project leader of research and development on under-water detection systems. Prior to this latest appointment he was chief development engineer, in which position he is succeeded by **Mr G. A. McKenzie,** who was formerly with Plessey Co., before joining Epsylon early in 1960.

After 26 years' service with the General Electric Co. Ltd., **Mr J. P. Clifton,** A.C.G.I., A.M.I.E.E., manager, Technical Manuals Department, at the Witton works of the company, has retired, but will continue to serve in a consultative capacity until the end of September.

Previously assistant director of electrical engineering with the Director-General Ships, Admiralty, at Bath, **Capt G. R. B. Pattison,** C.B.E., B.SC., M.I.E.E., RN(Retd.), has joined Plessey Nucleonics Ltd. (one of the Plessey group) as deputy general manager.

Chief project engineer in the Hawker Siddeley Nuclear Power Co. Ltd., **Mr W. Smith** has been appointed Reader in Mechanical Engineering at Hong Kong University.

Mr R. G. McCoy, B.SC.(ENG)., A.F.R.AE.S., M.S.A.E., is responsible for administration and general direction of Hawker Siddeley Engineering, the new Division formed by Hawker Siddeley Industries, to which we refer on page 275. General manager is **Dr D. R. Hardy,** M.SC., LL.D., M.I.E.E., M.I.MECH.E., deputy general manager is **Mr W. L. Beckett,** and manager of the Power Dept. is **Mr R. A. Park,** M.I.E.E., M.INST.F.

Mr P. T. Fletcher, C.B.E., B.SC., A.M.I.MECH.E., special assistant to Sir William Cook, member for reactors, U.K. Atomic Energy Authority, is to join the board of United Power Co. Ltd., on 1 October. He will take charge of construction and supply.

OBITUARY

Mr T. J. Wright, branch administrator of the Nottingham office of Philips Electrical Ltd., died on 4 Aug.

Mr A. Hobson, M.SC., A.M.I.E.E., MEM.A.I.E.E., one of the founders of Smith Hobson Ltd., of which he was technical director, died on 15 Aug. Mr Hobson graduated at Manchester University and was with Ferranti Ltd., and the Hackbridge Electric Construction Co., before starting the manufacture of instrument transformers in 1936.

Prof E. Bradshaw, M.B.E., M.SC.TECH., PH.D., M.I.E.E., professor of electrical engineering at University of Manchester since 1952, died on 15 Aug., aged 52. Chairman of the North Western Centre of the IEE in 1954, he organised several courses for divisional and area board engineers at the authority's residential training centre at Buxton.

Mr J. Innes, C.B., B.SC.(ENG.), M.I.E.E., who was managing director of Cable and Wireless from 1947 to 1950 and was, subsequently, a director of the Telegraph Construction and Maintenance Co. for nine years, died on 16 Aug., aged 72.

Mr W. W. Hughes, who was chairman and managing director of the Hackbridge Electric Construction Co. Ltd. until 1944, died on 16 Aug., aged 89. He had also been a director of Hewittic Electric Co. and managing director of Kartret Switchgear Co. and of New Switchgear Construction Co.

Mr C. W. Langmaid, ASSOCIATE I.E.E., first assistant district engineer for the North East Suffolk district of the Eastern Electricity Board since 1952, died on 15 Aug.

Dr W. A. Macfarlane, C.B.E., chief executive of the National Industrial Fuel Efficiency Service, died on 19 August, aged 53.

Mr F. Bond, sales director of Newton Brothers (Derby) Ltd., has died. He had been associated with the firm since 1927 and was also a founder member and past-president of the Derby Electrical Society.

Lt-Col N. C. Phillips, D.S.O., M.C., chairman of Wolseley Engineering Ltd., died on 15 Aug., aged 78.

Mr M. Nicholls, F.C.S.S., A.M.I.I.A., A.M.B.I.M., assistant secretary (personnel) to the Southern Region, CEGB, died recently aged 52. (*ESH, 60.)

Mr H. G. Campbell

Mr F. K. Chorley

Mr G. A. McKenzie

Capt G. R. B. Pattison

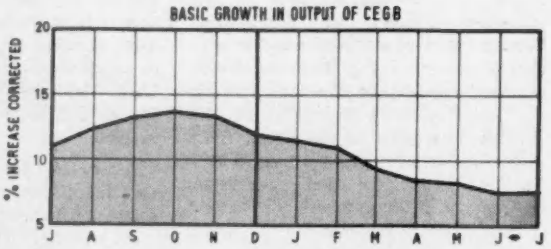
POWER SUPPLY

Statistics for July

THE area boards increased their sales for July by 9·8%, compared with last year, to 7,002·9 million units, with the strongest rises in the mainly industrial areas ranging from 11·2% to 14·7% except for a 6·2% increase in South Wales. In the non-industrial areas, increases were somewhat lower and, when the small increase in direct sales by the CEGB is taken into account, the national figure of sales increases reduces to 9·4%.

This is still further reduced to 7·7% when allowance is made for weather conditions and the number of effective working days. Electricity units sold by the CEGB for the month totalled 7,321·9 million units, while the figures for the SSEB and NSHEB were 519·3 million units and 124·3 million units, both increases of 13·2% over last year.

Generating capacity of the CEGB increased during the month with the commissioning of two 120 MW sets. These were the No. 2 set at Rugeley (Midlands), with a Parsons turbo-alternator and Babcock and Wilcox 860 klb/hr boiler, and the No. 2 set at Staythorpe "B" (East Midlands) also with a 120 MW turbo-alternator constructed by AEI and an 860 klb/hr boiler built by John Brown. The CEGB output capacity was 27,645 MW at the end of July, while no change was reported for either



of the two Scottish Boards. The output capacity for the United Kingdom was 30,438 MW, 7% more than last year.

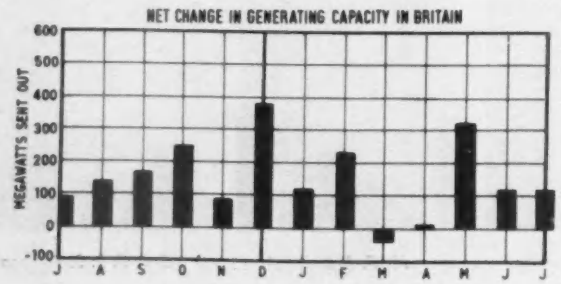
The total electricity generated for public supply was 8,515 million units, 9·6% higher than in 1960 and, once again, there was a substantial increase in coal consumption of 12·9% for the three boards to 3,634 thousand tons. During the month, consumption of coke, breeze and oil fell by over 4% compared with last year. Keeping pace with the electricity sent out, generation by steam was also 9·5% higher than last year at 8,361 million units, but hydro generation rose by 16·9% to 144 million units.

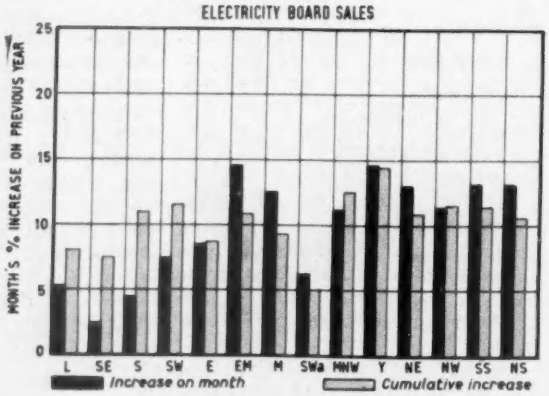
Over one-fifth of the SSEB district requirements were obtained from the UKAEA nuclear plant at Chapelcross, an increase of 26·6% on last year. Imports from the NSHEB also rose substantially during the month compared with last year, by 21·8% to 13·4 million units. Over the same period, 15·41 million units were exported by the SSEB to the CEGB. In the five weeks ended 5 July, generation by nuclear plant rose 21·9% above last year to 228·6 million units, an aggregate increase of 19·3% for the first six months of the year.

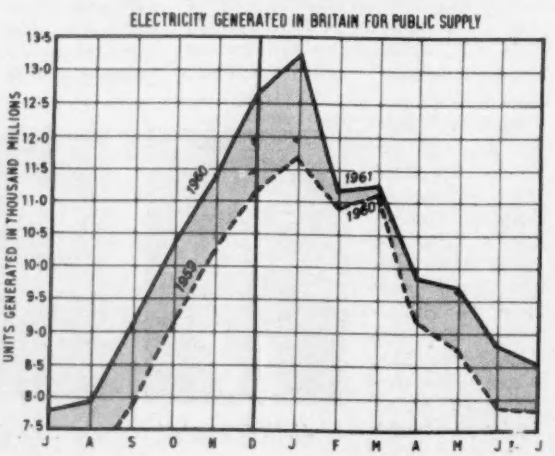
Electricity Board Sales Progress in July

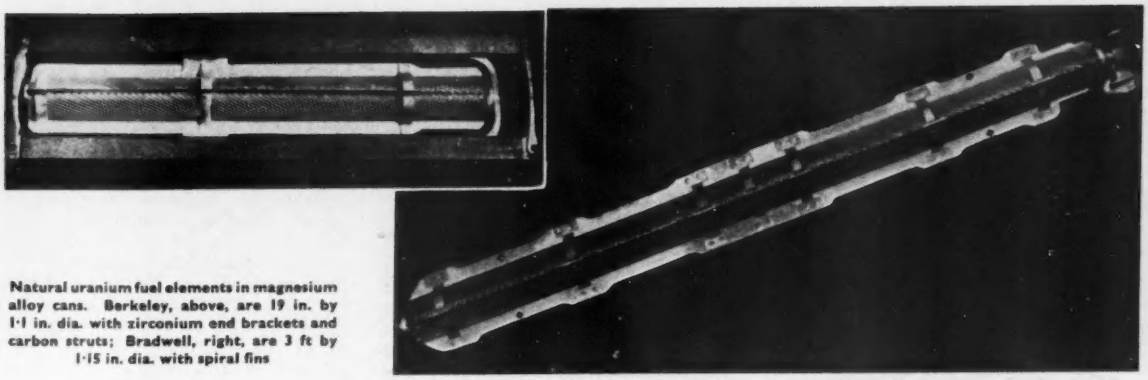
Board	Electricity sent out in millions of units	% Increase July 1960
London	544·1	5·3
South Eastern	419·3	2·3
Southern	572·5	4·4
South Western	290·7	7·3
Eastern	690·2	8·5
East Midlands	628·8	14·7
Midlands	792·8	12·6
South Wales	470·7	6·2
Merseyside and N. Wales	508·0	11·2
Yorkshire	838·7	14·7
North Eastern	470·0	13·0
North Western...	787·1	11·3
Direct Supplies by CEGB	319·0	0·9
CEGB Total	7,321·9	9·4
South of Scotland	519·3	13·2
North of Scotland	124·3	13·2

Table excludes area board purchases from other sources





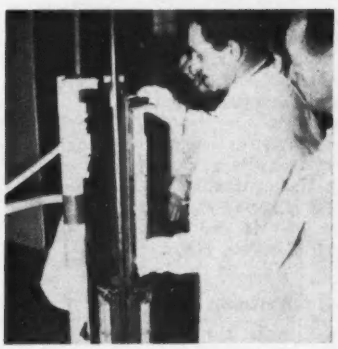




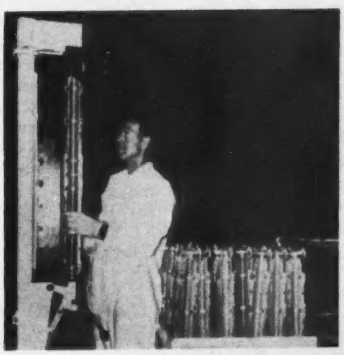
Natural uranium fuel elements in magnesium alloy cans. Berkeley, above, are 19 in. by 1·1 in. dia. with zirconium end brackets and carbon struts; Bradwell, right, are 3 ft by 1·15 in. dia. with spiral fins

BERKELEY—BRADWELL

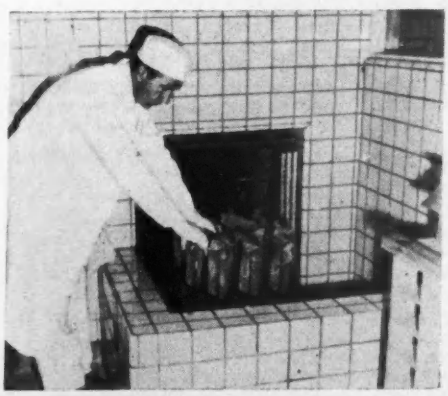
Now loading Goes critical



Elements being loaded into carrier. Berkeley reactor has 3,275 channels each with 13 elements. 660 channels should give criticality two weeks after the start of initial loading on 12 August

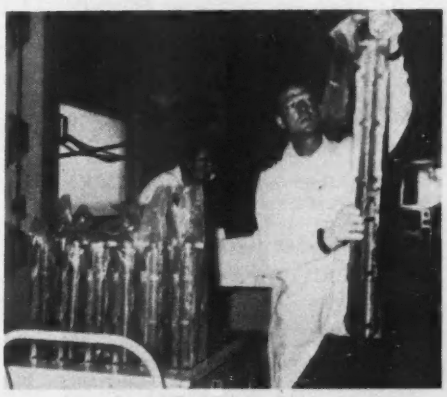


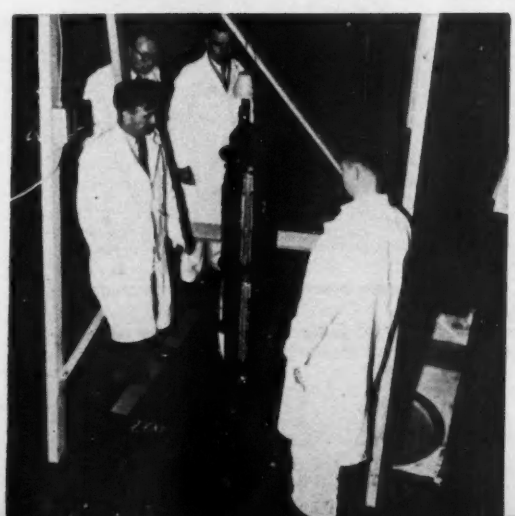
Bradwell element inspection at pile cap. There are 2,564 channels each with eight elements. 474 channels gave criticality last Saturday, six days after loading began



▶ Removing polythene covers for element inspection. Bradwell has two reactors, six boilers and six 52 MW turbo-alternators

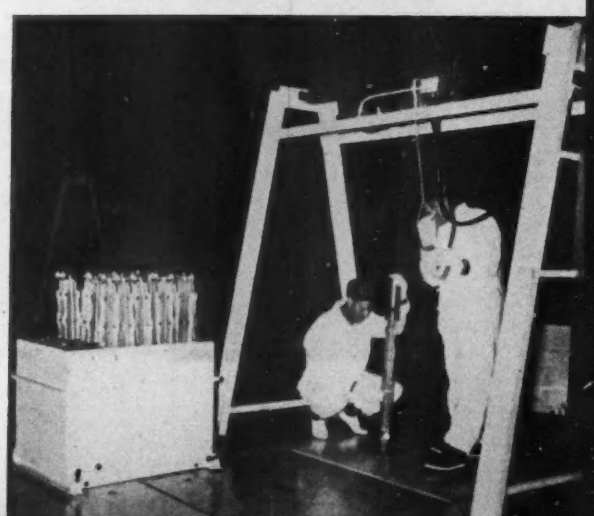
◀ Removing fuel elements from trolley for inspection at Berkeley. The station's two reactors will operate with eight boilers and four 83 MW turbo-alternators





▶ Lowering Bradwell element through pile cap standpipe. Initial loading is by hand at both stations

◀ Loading carrier with nine fuel elements at Berkeley being lowered through standpipe



new products and appliances

New Exide cell

A NEW 20 Ah (1,000 hr rate) 2 V battery cell, the DTP, is announced by Exide for intermittent and standby duties under floating or trickle-charge conditions. The cell comprises single negative and positive mass-type plates housed in a white polystyrene case with black polystyrene lid, and the terminals are of nickel-plated brass in the form of screws with slots for coin manipulation. Dimensions are 2$\frac{7}{16}$ in. long by 2$\frac{7}{8}$ in. wide and 5$\frac{1}{2}$ in. high and the weight, filled, is 2 lb 3 oz. Price, uncharged, is 14s 6d. *Chloride Batteries Ltd., Exide Wks, Clifton Junction, Manchester.*

More price changes

GAY-DAY (Domestics) Ltd. have absorbed the recent purchase tax surcharge for which their washing machine/spin dryer is liable. The cost remains at 79 gn, with an optional extra table top at £2 19s.

Prices of the Servis home laundry equipment have been raised to meet recent purchase-tax increases.

A clip-on rail finished in chromium plate is now available for Hurseal Gulf radiators at £2 5s 1d. A double rail costs £3 6s.

Gay Day (Domestics) Ltd., Chorlton St, Manchester 1.

Wilkins and Mitchell Ltd., Darlaston, Staffs.

Powell Duffryn Heating Ltd., Vale Rd, Camberley.

A.C. automatic voltage stabiliser

FEATURING a transistorised servo-amplifier actuating a motorised "Variac" auto-transformer, the "T.S.1" a.c. mains voltage stabiliser unit has been introduced for supplying control, measurement and similar electronic equipment. The "Variac" feeds the primary of an auxiliary transformer, whose dual secondary feeds an error-correcting voltage to the mains supply. The servo-amplifier continuously monitors stabilised output voltage with respect to a zener diode reference. The unit may be set to give any value of stabilised voltage in the range 200 V to 254 V at a maximum output of 4 A with auxiliary transformer secondary windings series connected. Dependent upon particular "Variac" tappings selected, permissible variations of input voltage can be −17·5% to 7·5%, ±12·5% or −7·5% to 17·5%. With parallel connected transformer secondary, a maximum output of 8 A is possible, but at the expense of reduced permissible input voltage variations.

Stabilised output is said to be unaffected by frequency variations in the range 47 c/s to 65 c/s. Having dimensions of 13 in. by 8 in. by 7$\frac{1}{4}$ in., and weighing 33 lb, price of the unit is £69 10s. *Claude Lyons Ltd., Hoddesdon, Herts.*

Exide's 20Ah, 2V battery cell DTP costs 14s 6d uncharged

Traditionally styled table lamp

TRADITIONAL styling is a feature of the "County" table lamp, which takes the form of a lantern with multi-coloured lenses. The stand and main body are constructed of plastics material giving a wrought iron effect. It is also available with amber or clear lenses and has an on/off switch fitted to the flex. Price is 39s 10d including tax.

Designed for wall and ceiling mounting are a series of fittings having opalescent conical-shaped shades in a variety of colours. Styled "London Town," the pendant ceiling fitting can have either three or five arms, while the wall bracket in the same range has only two. Prices, which include purchase tax, vary from 33s 2d for the wall-mounted unit to 76s 11d for the five-arm ceiling pendant. *Duncan, Partners and Price Ltd., 33 Petergate, S.W.1.*

Megohmeter for routine tests

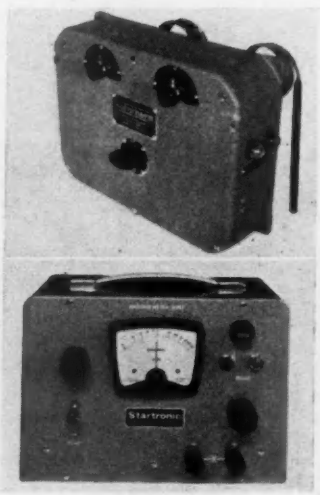
INTENDED for routine insulation testing on the production line, a mains-operated, transistorised megohmeter has been announced. Designated "Model 122," the instrument gives resistance readings on a 3$\frac{1}{2}$ in. directly calibrated meter, the resistance range being determined from a mid-point scale reading; the corresponding minimum resistance reading is approximately half the mid-point value, with a maximum of infinity. The mid-scale reading can be set up to an accuracy of ±1% by means of a built-in calibration standard. A variety of test voltages and resistance ranges is available to individual requirements, typical mid-scale resistance values being between 1 megohm and 80 megohms with corresponding test voltages between 50 V and 1,000 V. Housed in a mild-steel case of dimensions 10 in. by 7 in. by 6 in., price of the unit is approximately £45. *Startronic Ltd., 117a Malden Rd, New Malden, Surrey.*

Spares for kettles

SPARE elements suitable for the Premier/Hotpoint kettle are announced by Metway. They are available in two ratings, 1·5 kW and 2 kW, priced at 27s 6d and 30s, respectively. Locking collars cost a further 4s 6d each. These figures are the full retail prices. *Metway Electrical Industries Ltd., Canning St, Brighton 7.*

Dual-zone temperature controller

DESIGNED for temperature control of two separate heating zones, a recently introduced piece of equipment works in conjunction with Bourdon tube temperature sensitive elements. These actuate 30 A mercury switches giving on/off control of dual mains voltage heating circuits. Housed in a neat aluminium case, the control unit incorporates indicator lamps and is supplied with two 10 ft lengths of copper-sheathed capillary connecting the temperature bulbs. Temperature control ranges are available between limits −20°F and 1,000°F, with a minimum coverage of 100°F. *British Rototherm Co., Ltd., Merton Abbey, S.W.19.*



Above, Rototherm dual-zone temperature controller

Below, mains operated insulation tester by Startronic

Clothes dryer for flat dwellers

OF great use to the flat or maisonnette dweller is a collapsible clothes dryer introduced by Ekco. It is easily portable and requires little storage space when not in use. A wooden rack, on which clothes are hung, fits securely on top of a 1 kW drip-proof convector heater. Called "Sun-dri," the heater is finished in a light hammertone bronze. As an optional extra a washable cover is available, and is said to assist drying. This appliance is available for the coming heating season and sells at £8 6s 11d, including purchase tax and 10% surcharge. *E. K. Cole Ltd., Southend, Essex.*

Prices and products

CONSEQUENT to the Chancellor's purchase-tax surcharge imposition, prices of the Remington electric shavers have been raised by 10%.

Increased production is attributed to price reductions on the majority of products by P and R Electrical. In some cases these are as much as 15%. A revised price list is available.

Warmalec have introduced a heating pad for dog baskets, and a kettle for motorists which runs off a 12 V car battery. These sell at £3 5s 7d and £1 12s 6d, respectively, both prices include purchase tax.

Remington Electric Shaver Ltd., Kensington High St, W.8.

P and R Electrical (London) Ltd., Berrymead Gdns, W.3.

Warmalec Ltd., Pembroke Rd, Ruislip, Middx.

Christmas in the air

ALTHOUGH it is still only August, some manufacturers are launching their ranges of decorative lighting for the Christmas season. Two new additions have been made to the range of Mazda lamps, bringing the total number of sets on the market to eight. Following the trend of artificial flowers set by their "Rosebud" lights, a 27 in. high tree, called "Silver Spruce," can be used equally well on its own or as a decorative attachment for table lamps. Constructed of foil it is easily collapsible, the trunk being made rigid by use of a metal rod. Twenty miniature lamps are supplied with this decoration, which has a stirrup attachment and, as an alternative, a small red tub. Lights can be interwoven among branches and the complete set costs £2 8s 4d including tax. The other new entry is a decorative selection of frosted globes—"Pom Poms"—which are rated at 12 V and supplied with an adaptor. These can be used either to decorate trees or festoon alcoves and arras rails. Another suggested use is to brighten the garden or terrace during summer barbecues. "Pom Poms," in sets of 20, retail at £3 10s including tax. *AEI Lamp and Lighting Co. Ltd., Melton Rd, Leicester.*

High-capacity microswitch range

FEATURING exceptionally high making and breaking capacities, a new group of precision microswitches has recently been added to the existing Burgess range. Designated type "K5," the switches are of the double-break pattern, a typical rating being 25 A at 250 V a.c., non-inductive. Other ratings include 15 A at 250 V a.c., inductive, and 5 A at 250 V d.c., non-inductive. Two types of actuator are available, these being either a cylindrical plunger or an internally pivoted wedge device for operation by cam or similar mechanism. Switch contacts can be arranged to give single-pole changeover, or direct on-off switching and have connections to "Faston" solderless terminals protruding from the rear of the housing. Moulded in phenolic compound, the switch housings have two 4 BA mounting holes at 1 in. centres. Alternatively, the switch mouldings are available with metal frames to enable flush mounting. Price per switch ranges from 6s 6d to 7s for quantities up to 5,000, and from 3s 11d to 4s 2d for larger consignments. *Burgess Products Co. Ltd., Dukes Way, Team Valley, Gateshead 11.*

TRADE PUBLICATIONS

ACCESS EQUIPMENT.—Illustrated news bulletin giving details of lightweight stagings, tube joints, etc. Access Equipment Ltd., Hemel Hempstead, Herts.

A.E.I.—New commercial lighting catalogue illustrating large range of opal glass type fittings for use with Mazda G.L.S. lamps. A.E.I. Lamp and Lighting Co. Ltd., Melton Rd, Leicester.

AIRMEC.—Leaflet describing l.f. signal generator type 252. Airmec Ltd., High Wycombe, Bucks.

BATT.—Two stock lists, one of switchgear and the other of cables, together with relevant prices. Batt Electrical Co., Dock St, E.1.

BROOK.—Novel leaflet detailing some of the range of electric motors from fractional to 600 h.p. Brook Motors Ltd., Huddersfield.

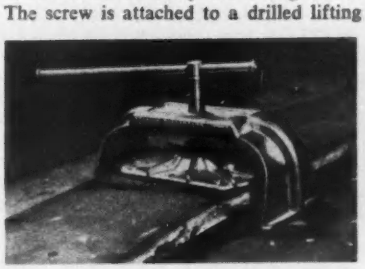
FITZGIBBON AND MURRAY.—Illustrated catalogue of electrical accessories manufactured by Fitzgibbon and Murray Ltd., Smallfield Wks, Horley.

HASSETT AND HARPER.—Illustrated brochure giving details of cabinets for electronic equipment. Hassett and Harper Ltd., Regent Pl, Birmingham.

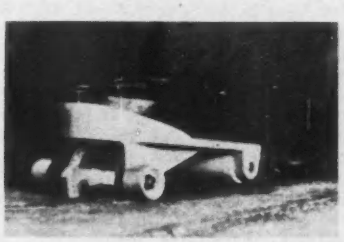
Floorboard Lifting Aids

AVOIDANCE of damage is the main advantage claimed for the use of recently introduced floorboard lifting equipment, which should provide a useful addition to the electrician's standard kit. The equipment comprises three tools, the first item being in effect a foot-operated rotary cutter for dealing with tongued and grooved boards. The circular cutter of hardened tool steel is mounted beneath a platform similar in appearance to a roller skate, but with a single roller at the rear and two rollers at the front, on either side of the cutter. The front rollers are adjustable and serve to limit cutting depth. By pushing the device forward by foot pressure, the cutter is said to slice easily through the tongue. The second tool is a single floorboard lifter, consisting of a cast-metal bridge which straddles the board and which incorporates a tapped hole at its centre to carry the lifting screw. The screw is attached to a drilled lifting plate which, in turn, is secured to the board by a suitable number of woodscrews. A tommy-bar is provided for rotating the screw, which is capable of exerting a lifting force of up to 2 tons. Once the board has been lifted clear, a support bar can be inserted and the board sawn off at a suitable joist position. Bridge sizes are available for board widths of 6 in. and 10 in.

Having lifted one floorboard clear, a third tool is available for speedily prising up the remainder without bruising the board edges. Fabricated in light alloy, it features a separate lifting head with twin curved blades hinged to an insulated operating handle. The insulation gives extra safety to the operator, should live wiring be interfered with during lifting operations. The blade head can be reversed to allow boards near the skirting to be removed. Prices of the three tools mentioned are, respectively, 47s, 54s and 141s. *Explosive Power Tools Ltd., Hope St, Dukinfield, Ches.*



Screw actuated floorboard lifting device



Board tongue cutter operated by foot pressure

Modern Domestic Heating Concepts

TRENDS away from conventional domestic heating appliances are being pursued by manufacturers, some of whom are exploring fields of central heating systems and the use of under-carpet heaters. Both these methods present the problem of greater initial cost than electric fires and fan heaters, but set against this the advantage of more even heat distribution in a wider area.

For "whole house" heating the Nottingham firm of Lectra Heat have produced a system which, by comparable solid and oil fuel standards, is not excessively costly to purchase and install. Employing a series of ducts to convey warm air to each room, it is obviously preferable that units should be built-in during the construction of a house, but the manufacturers say that it can also be installed in existing property without too much damage to structure or decorations. They also claim that this costs little more than installations in houses during the course of construction, which can be between £100 and £150.

The central unit is designed to fit into the base of a small cupboard standing on a 6 in. concrete plinth sunk into the floor. It has a heating capacity of 20,000 B.Th.U./hr and rated at 6 kW. This is said to provide comfortable heating conditions at ground-floor level with background heating on the first floor.

Hot air is propelled through ducts by a low speed centrifugal fan and dissipated in rooms through outlet louvres equipped with air control dampers and fitted above skirting boards. The unit has a 24 hr seven-day time switch fitted in the control panel and 25 A room thermostats give temperature ranges from 32°F to 86°F. A low level 70 sq in. inlet louvre needs to be fitted into the compartment where the unit is sited, as it requires a minimum air intake of 400 cu in./min. The makers also recommend some form of roof insulation to obtain maximum efficiency.

Heated Underlays

A form of pseudo central heating is the heated carpet underlay. Prime advantage of this method is that it requires no structural alterations, underlays are simply fitted beneath carpets! To be efficient, at least three-quarters of the floor area should be covered by the underlay, which gives heat equivalent to that of a 1 kW conventional fire spread over 10 sq yd. However, in very cold weather a small extra heat source is recommended by the manufacturers. Elements are insulated in waterproofed plastics. A de luxe model, available in sizes up to 12 sq yd, costing more than £25, has the heating element sealed in an underfelt and is suitable for use without any other form of felt. The interlay model, for laying between felt and carpet, also in sizes up to 12 sq yd, costs more than £21.

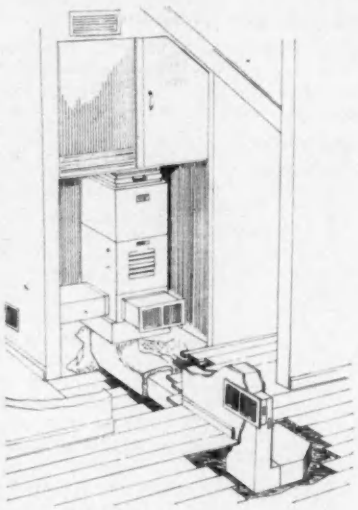


Figure shows central unit fitted conveniently into a cupboard. Ducts dissipate hot air

Lectra Heat Ltd., 79 Gregory Boulevard, Nottingham.

Warmalec Ltd., Pembroke Rd, Ruislip, Middx.

Materials for Electrical Design

POLYESTER THERMOSET TAPE

A NEW self-adhesive polyester tape with thermosetting properties which, after curing at 150°C for 1 hr, will withstand temperatures up to 180°C without deterioration or loss of electric properties, has just been marketed. The tape is opaque and coloured yellow as a means of identification. *Paynes Jiffytape Ltd., London W.C.1.*

HEAT TRANSFER FLUID

FOR closed heat transfer systems in enclosed spaces using a liquid transfer vehicle in either liquid or vapour phase, a eutectic mixture of diphenyl oxide and diphenyl, marketed under the name of "Thermex," has considerable advantages over the more usual water systems. At the normal practical limit of 400°C the vapour pressure is only 160 lb/sq in. as compared with 3,000 lb/sq in. for steam. Used in the vapour phase, it gives high condensing film heat transfer coefficients, is stable at high temperatures and has a good viscosity/temperature relationship. It is non-toxic and non-irritant and the presence of small vapour leaks is immediately apparent by the strong geranium-like odour, which is easily detectable at concentrations of less than 10 p.p.m. Combustible at elevated temperatures, the high flash point (240°F) minimises fire risks, while vapours escaping to atmosphere from small leaks rapidly condense and cool to well below flash point. *Heavy Organic Chemicals Div., ICI, PO Box 19, 81-87 High Holborn, W.C.2*

COMMUTATOR CEMENT

REPAIRS for pitted commutator micas can be carried out conveniently with Early's commutator cement, which is again available in this country. The cement, which has a melting point of 3,000°F, makes a homogeneous union with the mica. Repairs are effected by cutting away the burnt mica and applying the cement, afterwards allowing it to dry. It may also be used for filling the grooves above undercut micas. *Agents in the UK: Godfrey and Co., 28 Hale La, Mill Hill, N.W.7.*

HIGH PRESSURE HOSE

NYLON hose, reinforced by an outer cover of high tensile braided yarn and with a further external abrasion-resistant cover, all chemically bonded together and offering advantages of high chemical resistance, excellent fatigue properties when flexed and outstanding bursting strength, is now available under the trade name of "Nylaflow." Other points of merit are the light weight—about one-fifth of that of an equivalent rubber hose—wide temperature range (−40°F to 250°F) and retained flexibility and toughness down to −4°C. Specially developed for use with the hose are coupler fittings, male and female, which can be attached in the workshop in a few minutes or can be supplied already attached to length of the hose as complete assemblies. "Nylaflow" hose is particularly suited to hydraulic lines carrying modern types of fluids or refrigerants. A conductive grade of hose, incorporating a stranded copper conductor between the braid and inner hose, is also available. *Polypenco Ltd., Tewin Rd, Welwyn, Herts.*

LOW EXPANSION PTFE

ONE of the shortcomings of pure polytetrafluoroethylene is its relatively high and non-linear coefficient of thermal expansion. A newly developed grade, "Fluorosint," incorporating other special constituents, has a linear coefficient about one-sixth of that of p.t.f.e. and almost as low as that of aluminium. It is, therefore, ideal for machine fits and bearings operating at high temperatures or subject to thermal cycling; moreover it will withstand much higher loads than p.t.f.e., less deformation, greater hardness and better dimensional stability under thermal shock. Electrical properties are comparable to those of p.t.f.e. over the full frequency range. *Polypenco Ltd., Tewin Rd, Welwyn, Herts.*

PROBLEMS AND PRACTICE

We welcome contributions to this feature; those published will be paid for at our standard rates. There must be many problems encountered in day-to-day electrical work, or useful ideas or tools devised to facilitate tasks; all make instructive reading.

Tripped

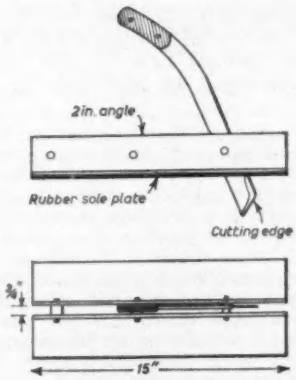
YOUR article, "Maintenance of Motor Control Gear" (Industrial Electricity, page 229 last week), brings to mind an experience some years ago. I was on the staff of an electrical installation company and I had instructed a group to install a 90 h.p. motor, with auto-transformer starter, in a factory. This had been done under the supervision of a leading hand; but he found that, every time he started up, the main breaker on the factory distribution board tripped. Suspecting a fault in the starter, he called me and I went down to see what was wrong. First checking through the connections and finding nothing which appeared wrong, I started the motor up. Surely enough, on the third step the breaker tripped, shutting down the shop. It was quickly reset and again I carefully examined each part of the equipment. Warning the shop foreman, who was getting quite annoyed by the shut-downs by now, I tried once again. The same thing happened. This time I reset the breaker myself and I happened to notice that the trip coils were set at 120 A. Enough to cover the motor current, I thought, but what about the remaining load on the circuit? I asked my leading hand if he had altered the main breaker setting to allow for the increased load of the new motor. He replied that he had not. Should he have done? I pointed out the obvious and increased the breaker setting by 100 A. After that all was well.

It is a remarkably easy thing to overlook, but whenever a new motor or piece of equipment is connected on the line, one should also check that the main breaker, if there is one, is reset to allow for the additional load.

On another occasion we were troubled by a noisy a.c. contactor, of the double-pole armature type; that is, one in which the moving part of the iron circuit is a U-shaped laminated core with two faces to meet the fixed core. Despite every adjustment known it would not be silent, so we contacted the makers. "Try reversing the armature," they said. We tried, and that was the answer. Asked later how this cured the trouble, they said: "We don't know, but it usually does!"—*J.C.F.*

Domestic Wiring Tips

WHEN wiring occupied houses, it is usually accepted that the wireman and/or his mate will have to lift floorboards, slot joists and plaster facings of

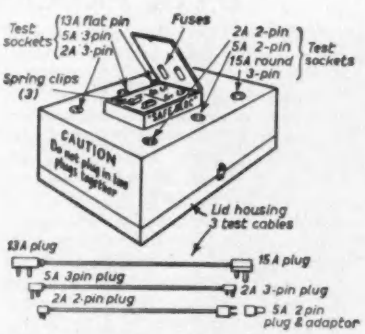


A simple tool for cutting tongues of floorboards prior to lifting for cable installations

walls, etc. Much of the occupant's goodwill afterwards will depend on how this "civil engineering" has been done and made good. Splintered and loose floorboards, dirty walls and cracked or missing plaster is a sure sign of a poor craftsman.

Floorboards can be lifted without damage and little noise if the tongues are first cut. Where there is a good space between adjacent boards through shrinkage since they were laid, this can be done with a tenon saw. If the gap is small, then a tongue-cutting tool, resembling a large old-type tin opener, is more suitable. If a proprietary make cannot be obtained, a simple counterpart can be made from 2 in. angle steel and a length of ¼ in. by 1½ in. tool steel (see sketch). Cuts across the board should be made with a pad saw, using a new, sharp blade. Efforts to raise the floorboard should never be made until the tongues have been cut; splintered and badly damaged boards will only result otherwise.

Removal of the retaining nails is a noisy procedure by the normal method of punching them down and is rarely satisfactory. If a $\frac{7}{16}$ in. twist drill is used to make a hole adjacent to each nail, using a breast drill, the nail can easily be punched into the drill-hole and the board lifted. The nails can then be drawn and, when the board has been replaced, the drill holes can be plugged with dowelling, levelled flush and topped by plastic wood or putty, finishing off with sandpaper. Boards over junction boxes should, of course, be held down by screws. Slots in joists should be made at carefully chosen positions and should not be too deep or the joist may be weakened. Where bare cables are laid in slots, it is advisable to cover them with a short length of steel angle, vee-edge uppermost, to deflect any nails which may be driven through the floorboards at the point. Holes in plaster and cement will be cleaner if the drills or special masonry drifts are kept sharp. All holes should be made good with sand-cement mixtures, finishing off with a skim of plaster or one of the modern proprietary fillings.—*F.S.*



Made from spare electrical components this interconnector box is a useful accessory for home or office demonstrations

Demonstration Hook-up

THE attached sketch shows the details of a very handy piece of apparatus we have devised for demonstrating dictating and recording machines on customer's premises. It comprises an old bakelite case from a disused dictating machine with a "Safebloc" mounted on the outside of the base. Six sockets are wired to the "Safebloc" which provides the connection, without plugs, to the machine via the clip terminals. The case itself accommodates a selection of cables with plugs of varying size as shown, enabling supply to be obtained from any type of socket or lampholder which would normally be found in service. Opening of the "Safebloc" lid isolates the terminals for connection to the machine. Although the device is merely an adaptation of old parts which can be found in any normal electrical workshop, it has proved invaluable in service since it obviates the time-wasting—and to the customer, frustrating—procedure of electrically connecting the machine cable to a plug suitable for the socket, in many cases having had to disconnect the plug from the customer's appliance, beforehand.—*F. B. Miles.*

News of the Week

2,000 MW Station for Fawley?

C.E.G.B. Seek Consent for Oil-burning Plant

CONSENT for the establishment of an oil-burning power station at Fawley, on Southampton Water, is being sought by the CEGB. Application is being made to the Minister of Power and the local planning authority. The site at Fawley is suitable for a station of approximately 2,000 MW capacity. To meet the growing electricity demand in the south of England, the first unit will be needed in 1967.

The proposed station would be built on reclaimed land and saltings—no part of the site would encroach on the modified boundaries of the Green Belt suggested by the Minister of Housing and Local Government.

This point may well be challenged at a public inquiry, for New Forest Rural Council have already objected to the exclusion of the area fom the Green Belt, and are expected to object to the proposed station on those grounds.

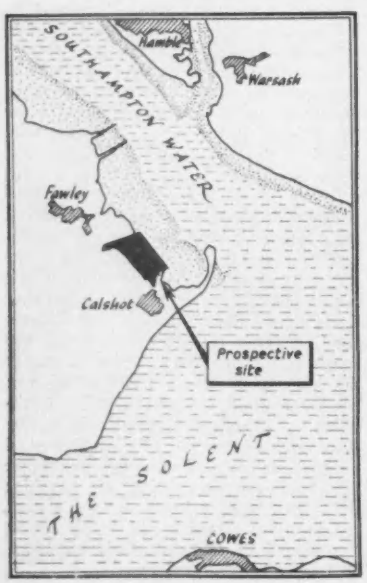
The Southampton Water site was investigated by the CEGB as an alternative to a suggested plan for a nuclear power station at Hamstead, on the Isle of Wight, which met a good deal of local opposition. The Board now add that if the Fawley project is approved then consideration of the establishment of a nuclear station at Hamstead can be deferred.

With the Esso oil refinery almost adjoining the site, oil is the most economical fuel for electricity generation in the area.

An overhead 400 kV transmission line running northwards, and a submarine cable across Southampton Water, are also proposed. The routes of these lines have yet to be discussed with the local planning authority and interested bodies before applications for consent for them are made to the Minister of Power. The possibility of reducing the number of lower voltage lines on the west side of Southampton Water is being investigated.

The CEGB consider that, with a clear and vigorous outline, and with careful attention to every aspect of design, the station could impressively mark the entry to Southampton Water and the termination of its western industrial margin.

On behalf of the Solent Protection Society, Lord Huntingdon, welcoming the decision to defer building a nuclear station at Hamstead, expressed the hope that no such station would ever be built in that area.



Further station for South Yorkshire

WITHIN the next few months the CEGB will be seeking consent for yet another coal-fired power station in the south of Yorkshire, or possibly around Nottingham if a site acceptable to the local people can be found, Sir Christopher Hinton revealed at Newcastle last Friday. The south Yorkshire site presumably refers to Gowdall, just south east of Eggborough, which we reported on 13 April was regarded suitable.

NEW LAMP FROM U.S.

A NEW type of filament electric lamp is claimed to have been developed in the US by research scientists of the Polaroid Corporation. Claimed to have an output 25% higher than the normal tungsten lamp, it has a tantalum carbide filament in a gaseous mixture. It is reported that negotiations have been started by Sylvania Electric Products for a licensing agreement permitting commercial production.

Lamp machinery take-over

ANSTEE Works, Bedford, maker of machinery for the production of incandescent lamps, radio tubes and photoflash lamps, has been acquired by El-tronics Inc., of the US. Anstee become wholly owned by the American firm's English subsidiary, El-tronics (Great Britain).

Another S. of Scotland slurry station

THE South of Scotland Electricity Board is now seeking official consent for the establishment of a new generating station on a site at Methil Docks, Buckhaven, on the Fife coast. Application has now been made to the Secretary of State for Scotland. A site of 11·7 acres is envisaged for a 60 MW station which, as we earlier reported, is proposed to burn slurry. It will have two 30 MW sets and 275 klb/hr boilers, scheduled for commissioning in 1965-66.

The British Transport Commission, owners of the land, have already approved the plan which has been put forward by the Board following the success of their Barony station, which has been operating on similar fuel since 1957.

DATA PROCESSING BY WIRE

DEMONSTRATING the possibilities of processing data from remote sources, using a centralised computer, Standard Telephones and Cables last week set up an experimental data transmission link between the company's headquarters at Aldwych, London, and a STANTEC computer installed 30 miles away at Harlow, Essex. A GPO telephone line was leased for the occasion, allowing a transmission rate of 1,000 bauds from the source, return information from the computer being transmitted at 50 bauds. The latter relatively low transmission frequency was selected in view of the normally smaller volume of information handled from the computer source. For last week's demonstration, the computer was programmed to perform relatively simple tasks, well within its maximum capabilities. For its audience at Aldwych it carried out summation of series, determination of arithmetic mean and sorting of random numbers in ascending order. Answers arrived back in the form of teleprinter messages almost as soon as problems were submitted. The STC system receives unprocessed data in coded form, punched out on paper tape. The tape is fed to a reader, suitably modulated and transmitted to the distant computer. The particular programme required of the computer is selected by making a phone call to the computer operator immediately prior to data transmission.

APPLIANCE STATISTICS IN ONE VOLUME
NEW B.E.A.M.A. SERVICE

NO longer will manufacturers and market researchers have to chase around among numerous pamphlets when they wish to size up the appliance market. BEAMA have just released the first issue of a yearly statistical review which collates in a single volume practically all of the statistics available on UK's domestic electrical appliance industry, as well as a selection of information on appliance production and levels of saturation in major foreign countries. Together with quarterly supplements, the book constitutes a new service which is available to both member and non-member subscribers. The annual subscription is 2 gn in the case of BEAMA members and 5 gn to non-members.

The service has been introduced to meet not only the needs of member manufacturers, who have already been receiving much of the information through the *BEAMA Bulletin*, but also of many other inquirers. After an introductory survey, which sets the UK industry in its context, with regard to size, structure and scope, the first two-thirds of the 64-page book are devoted to BEAMA's figures on manufacturers' deliveries from 1960 back to 1948. As is well known, these figures cover both home and export.

Imports are dealt with in the second section as well as purchase tax and hire purchase changes, area board sales, price indices and levels of saturation. In this issue, details of output in France, West Germany, Italy and USA are covered, and saturation levels for a wide range of appliances in UK, West Germany, USA and Japan, but it is intended to steadily expand the service's scope.

As far as the home industry is concerned, certain Customs and Excise figures, which are not directly comparable with BEAMA's, are about all that are not covered. To avoid confusion, the breakdown of exports by destination will continue to be dealt with in a separate analysis published by BEAMA annually at 7s 6d. Not the whole of the appliance section of the official *Report on the Census of Production for 1958* is dealt with, but as BEAMA's more up-to-date figures on manufacturers' deliveries are given, these would be superfluous.

The supplement for the first quarter of 1961 accompanies the current issue, and includes BoT sales indices up to May.

OFFICIAL PUBLICATIONS

Select Committee on Nationalised Industries. Report on Gas Industry. HMSO. 6s 6d (see page 251).

HM Chief Inspector of Mines for 1960. HMSO. 4s (see page 276).

UKAEA Reports:
Reliability of Protective Systems for Zero Energy Reactors, by D. Wray and M. J. Cowper. HMSO. 2s 6d.

The Activity of Irradiated Uranium Fuel Specimens at Times Greater Than Ten Hours After Irradiation, by I. S. McGill. HMSO. 3s.

ERA Publications:
V/T141. Dispersion Meter Model 4A. Instruction Manual. 12s 6d.
Y/T26. Performance of Electric Floor-Heating Installations in Large and Small buildings, M. V. Griffith and S. W. Menzies 28s; Y/T27, Comparative performance of directly-embedded and ducted electric floor-heating systems. Further laboratory tests on wider spacings, D. H. Gardner 10s. 6d.

NEW ENERGY SOURCES

THE possible practical applications of three unconventional sources of energy—solar radiation, wind power and geothermal steam—are being discussed at a United Nations' conference, which began in Rome on Monday.

The conference, which continues till 31 Aug., is being promoted by the Economic and Social Council as part of UN efforts aimed at stimulating economic development, particularly in the backward countries. It is being attended by representatives from many countries, including 18 delegates from Britain. Some 20 reports are being presented on certain developments which have taken place in various parts of the world.

In the US, the Westinghouse Electric Corpn have produced a 50 W prototype of a solar energy plant.

DEVON LINE INQUIRY

A PUBLIC inquiry is to be held at Newton Abbot on 29 Aug. into the proposal of the South Western Electricity Board to erect an overhead line at Bishopsteignton. The inquiry is to be conducted by Mr A. H. F. Linton, deputy chief engineering inspector, Ministry of Power.

New H.S.I. Engineering Division

Hawker Siddeley Industries Ltd. have formed a new division which will undertake the complete design and construction of such projects as electrical power schemes, harbour installations, radio telescopes, sewage plant, automatic railway control equipment, automatic warehousing, automated manufacturing plant and telemetry applications. It is expected that the new division, entitled Hawker Siddeley Engineering, will be as much as 90% self-sufficient on the majority of projects, and the remainder will be bought from British companies.

The forerunner of the new division was the General Engineering Division of Brush Electrical at Loughborough. Now transferred to Burton-on-the-Wolds, five miles from Loughborough, it forms the nucleus of Hawker Siddeley Engineering.

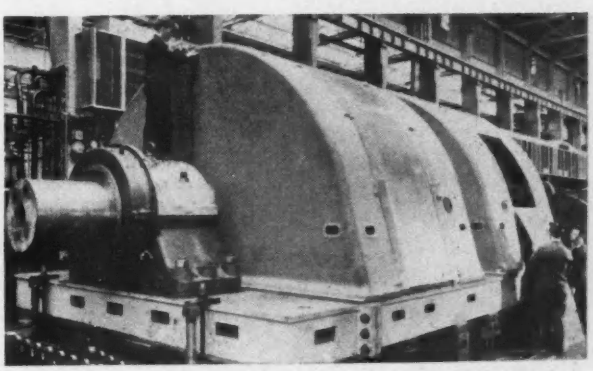
Nuclear Electronics Symposium

AN opportunity to hear and discuss reports of the international conference on nuclear electronics, which took place in Belgrade last May, is being provided in London by the IEE. The Measurement and Control Section is arranging a symposium on these lines for 30 Nov. and 1 Dec. at the Institution's headquarters. Registration forms can be obtained from the IEE secretary, and the fee is £1 for members and £1 10s for non-members.

Radiation Protection Course

THE fifth advanced course in the principles of radiation protection is to be held at Harwell Reactor School from 25 Oct., 1961, to 30 Jan., 1962. Some of the lectures will be given by staff of the school but the majority will be delivered by experts from Harwell and other UKAEA establishments.

A programme of visits to installations at Harwell and other establishments has been arranged and it is hoped that units of the Institute of Cancer Research and the Radiological Protection Service will also be visited. The fee for the course is £250 exclusive of accommodation.



Claimed to be lighter, smaller and cheaper than conventional metal covers, reinforced plastics end shields are fitted to this 6,000 h.p. motor, one of two for a twin drive in a steel rolling mill, seen being prepared for test at English Electric's Stafford works. The end shields, over 12 ft in dia, were made by the company's Reinforced Plastics Division at Freckleton

H.P. Offences — £470 Fines

CONVICTED of 13 offences under the Hire Purchase and Credit Sales Agreements Control Order, 1960, and the Control of Hiring Order, 1960, Mr A. Dobson, director of Dobsons (Sheffield) Ltd., radio, TV and electrical dealers, was fined a total of £130 at Sheffield Quarter Sessions last week. The company was fined a total of £260. His father, J. Dobson, and brother, E. Dobson, both directors since July, 1960, who each admitted eight offences, were both fined a total of £40. The three men were given a week in which to pay. In default, A. Dobson would be goaled for six months, the others for three months.

Prosecuting for the Board of Trade, Mr H. G. Bennett said the offences, committed between May, 1960, and October, 1960, concerned h.p. sales and renting of TV sets, tape recorders, radios, refrigerators, washing machines and electric shavers. The company owned 25 shops within a 40-mile radius of the city. It was alleged that, in most cases, the salesman first tried for the correct deposit; but, if he could not get it, suggested the customer should offer something in part exchange. In fact, however, the goods were in many cases never handed over. Less than the stipulated 20% deposit was accepted and, in some cases, more than 24 months for repayment was allowed. Of over 1,200 agreements examined, 200 appeared to show discrepancies, Mr Bennett claimed. The inspector who investigated the case estimated the firm's turnover to be some 200 agreements a week. In fact it was more than that.

It was stated that in May this year, control of the company, which now had 30 shops, was acquired by another firm which bought 75% of the shares. Mr A. Dobson remained a director, but the other two retired. The h.p. agreements were made with a finance company. The new controllers of the firm had redeemed these for a considerable sum.

Mather and Platt's Acquisition

THE capital of Kelly and Lewis (Pty.), one of the leading hydraulic engineering organisations in the southern hemisphere, has been acquired by Mather and Platt Ltd. from Brambles Industry Ltd., an Australian industrial group. Purchase price is said to be just under £A1 million. Mr W. L. Mather is to join the board of Kelly and Lewis, whose sales organisation will be amalgamated with that of Mather and Platt in Australia. This acquisition should make the latter concern the largest pump manufacturers in Australia.

NEW PAMPHLETS

A NUMBER of new and revised pamphlets on the use of electricity in agriculture and horticulture are now available from EDA. These are: *Electricity on the Farm, Electricity for Green Crop Conservation, Controlled Potato Chitting, Tomato Propagation by Electricity* and *Electric Bench Warming.*

Electrical Safety in Mines

ALTHOUGH concern is expressed at the number of accidents in mines and quarries, the report of HM Chief Inspector for 1960 shows that the electrical record was good. No fatal accident due to electricity occurred in the year and the increase in accidents during 1959 was fortunately not repeated. One of the improvements has been the increasing use of test plugs instead of short pieces of wire for testing on gate-end switches. But it is considered a better solution to provide a "test position" on the isolator of gate-end boxes, a feature which some designs now provide. A number of accidents occurred due to breaking of the cable at the point of attachment to underground equipment and a high standard of maintenance is called for.

Seventeen cases of fires occurred in 1960 involving the use of electricity. In three of the four cases where drill cables were involved, protective devices were defective. One fire occurred due to a trailing cable with fire resistant outer sheath being repaired by inflammable material.

Hinton Cup for Stella North

Mr C. Donaldson, station superintendent of Stella North power station, left, receiving the Hinton Cup for "good housekeeping" awarded to Stella North for being the tidiest and best kept power station of the CEGB. Making the presentation last Friday, Sir Christopher Hinton, right, spoke of the possibility of further power station developments in the north east if the NCB could offer coal at a reasonable price. He also referred to the likelihood of other station developments (see p. 274).

Electrically heated underfelts prevent cold feet at Mansfield Shoe Co.'s Oxford Street shop. Here, "Thermalay" underfelts totalling 4,646 W have been installed on two floors

PRE-BUDGET SALES

THAT electrical appliance sales in many areas, immediately prior to the Chancellor's "Little Budget," did increase appreciably is confirmed by Mr F. J. Cole, manager of No. 3 sub-area of the North Western Electricity Board. He has said that record sales were experienced at a number of service centres, resulting from the anticipation of an increase in purchase tax. In the week ended 4 July, sales were up by 5½%, rose by 11% in the following week, and by 25% in the week ended 18 July, and for the week to 25 July, just prior to the announcement, sales were up by 78%.

These figures were given by Mr Cole when announcing a new booklet on how to get the best use from electricity, written expressly for old people. It has just been issued by the Board and is being circulated to old people's organisations.

SUPPLIES IN WEST CUMBERLAND

THE North Western Electricity Board was highly commended last week for its drive in taking supplies to remote hamlets and dales in West Cumberland. The occasion was the inspection of a new 33 kV substation at Embleton by officials of Cockermouth Rural Council, Keswick Urban Council and Cockermouth Urban Council.

The new substation marks a further stage in a major development scheme designed to meet the increasing demands for electricity and to make available power supplies at short notice to any new industry. Mr J. Mills, manager of the Board's No. 6 sub-area, estimated that rural electrification of the area would be virtually completed in less than four years. Farm connections during the year ended 31 March last were a record.

Miscellaneous Electrical Output Grows

WHATEVER one hears about the comparative stagnation of the British economy, the miscellaneous electrical goods industry has not failed to grow in the post-war period. The value of net output, exclusive of the bought-in factor, was 38% higher in 1958 than four years earlier, the BoT's *Report on the Census of Production for 1958* shows. While the growth in volume would not have been quite as large, indications are that the rise in wholesale prices for this sector of industry would not have exceeded 10% during this period, which still leaves an annual rate of growth of 7%—more than twice the average rate of growth of the whole economy.

Less encouraging is the growth in productivity, particularly in view of greatly increased capital expenditure. The number employed, including working proprietors, rose at an annual rate of 5%, leaving a thin margin in relation to the 7% growth in the volume of output. Expenditure on new buildings was four times higher in 1958 than 1954 and investment in plant and machinery up 50%.

Another side of this greater use of machinery shows up in the increasing proportion of administrative, technical and clerical staff in the total labour force. Whereas the number of operatives rose by 15%, the number of other employees rose by 38%. It is interesting, too, that the earnings of the "white collar" workers have risen faster, for the amount paid to operatives rose by 50%, against 71% for other employees, a difference which is not wholly accounted for by the greater increase in numbers in the non-operative sector of the labour force.

Salient Points of Lamp Industry

	1954	1958
Sales*	18,612	27,653
Purchases of materials and fuel*	8,573	11,954
Payments for work done on materials given out* ...	87	66
Payments for Transport*...	233	451
Net output*	9,744	16,055
Average number employed		
Operatives	10,216	13,468
Other employees ...	2,588	4,742
Net output per person employed*	761	882
Wages per head:		
Operatives	£343	£438
Others	£525	£666
Capital expenditure:		
New Building* ...	29	382
New Plant*	540	671

* £000's

The main sections of the industry covered in this survey are: electrical equipment for motor vehicles, cycles and aircraft; primary batteries; secondary batteries; electric lamps; and other electrical goods, such as wiring accessories, lampholders, ceiling roses, plugs, sockets, switches, lighting fittings (but not the glassware sold separately), and flashlight cases. A point to be watched when looking at the census is that whereas the 1954 census covered all firms with 11 employees or more, and the latest inquiry does likewise for outline information, the more detailed information was this time required only from firms employing 25 and upwards.

One section not affected by the changed basis is electric lamps, where the number of firms is steady at 38. Here, however, the number of separate establishments operated by these firms has risen from 60 to 70, and the value of sales has grown from £18·6 million to £27·7 million.

How does the growth of the miscellaneous electrical industry compare with that of other sectors of the electrical industry as a whole, for which the Census of Production figures have already been released? Not too badly. Sales, including the bought-in element, rose by 36% from £140·1 million to £190·8 million, compared with a 40% rise for the domestic appliance industry and 47% for radio and electronic apparatus.

MULLARD MOVING

THE commercial divisions and most of the production staff of Mullard Equipment Ltd. will move to a new factory at Crawley New Town, Sussex, on 4 Sept. For the time being, two of the company's premises will be maintained at Wandsworth. The new 134,000 sq ft plant is on a site of 17 acres, on which future expansions are planned. Its address is Manor Way, Crawley, and the telephone number is Crawley 26386.

ELECTRICIANS STRIKE IN EIRE

SOME 2,600 electricians in Eire went on strike on Monday last. The dispute, over a new wage and hours claim, originated in the contracting side of the industry, but initially also applied to some 400 men engaged on maintenance and other operations with the electricity supply board. The Congress of Trade Unions directed power station men back to work on Tuesday, in order to avoid power cuts.

The majority of the workers are members of the Electrical Trades Union (Ireland). They claim an increase of 1s 3d an hour. The remainder, represented by the Irish Engineering, Industrial and Electrical Trade Union, seek a rise of 1s an hour, a five-day 40-hr week, and increased annual holidays.

The claims were recently presented to the Labour Court, which subsequently recommended an increase of 6d an hour and a reduction of 2½ hours in the present working week. The unions consider that recommendation unacceptable.

Staff Selection Methods

MR R. S. STOKES, warden of the Electricity Council Management Training Centre, will be one of two speakers at a one-day conference on staff selection at Glasgow on 27 Sept. Various methods of fitting the man for the job will be explained and investigated at the conference, which is arranged by BIM.

No Major Hitch with Fenchurch St. Trains

THE postponement in introducing an electric train service on the Fenchurch St-Tilbury-Southend line, announced by British Railways last week, is due to the process of adaption of new equipment in the Eastern Region rather than any further major technical difficulty. Even had the rolling stock been ready for the full electric service, to be introduced with the winter timetable on 11 Sept., there were fears that the overhead line might not have been finished in time, due to some difficulties which BICC have been experiencing with labour and the supply of materials. Now the need for English Electric to modify the traction motors supplied in the earlier part of the contract has emerged as the limiting factor. Some of these trains will be placed on the run in the late autumn and the numbers will be increased progressively, but no date can be given at present for the introduction of the full electrical service. In the meantime, the steam train timetable will be retained.

The trouble with the traction motors is apparently not serious. EE have not released any technical details, but they say it was due to a difficulty in a new manufacturing technique. A number of units have already been modified and are working perfectly satisfactorily, and it is believed that the difficulty has been overcome. Even before modification, the trains did not have to be withdrawn from service; in fact, some are still operating on the Liverpool St line to take the place of GEC units withdrawn because of teething troubles. An EE statement puts it this way: "Some modifications are desirable to ensure complete reliability of the motors in service."

Frontage of the new 40,000 sq ft factory of Royce Electric Furnaces at Woking. There are two main bays, 190 ft long

Cables Rationalisation

CONCENTRATION of the telephone cables manufacturing of both AEI and Enfield Cables into a single works at Dagenham is now complete. The Dagenham factory is operated by Telephone Cables Ltd., formed early this year with AEI owning around three-quarters of the capital and Enfield the remainder.

COMPUTER SYMPOSIUM

TWENTY-SIX practical experts on the best way to put computers to work will deliver papers at the Electronic Data Processing Symposium at Olympia from 4 Oct. to 6 Oct. The symposium is high-powered but expensive, as there is a separate fee of 2½ gn for each of the six sessions. This fee includes admittance to the Electronic Computer Exhibition, which will be taking place at Olympia at the same time.

Each of the three speakers at the first session also delivered a paper at the 1958 Business Computer Symposium, when the future of computers was largely a matter of guesswork. Now, with the additional three years' experience behind them, they will be able to make a comparison between actual and expected trends. Tickets are available from the Electronic Computer Exhibition Office, 64 Cannon St, E.C.4 (CENtral 7771).

New Partnership for Electrochemical Machining

A NEW partnership further to develop a revolutionary technique of electrochemical machining has been formed by BSA Tools Ltd., of Birmingham, and Metachemical Processes Ltd., of Crawley. The partnership, Metachemical Machines Ltd., has already acquired Kemworthy Jig and Press Tool Co., of Morden, Surrey, where initial production will be carried out.

The technique, which shapes metal by means of an electric current and a stream of electrolyte, was originated by the Steel Improvement and Forge Co., of Cleveland, of whom Metachemical Processes are the British associates.

Sayings OF THE WEEK

"It is freely acknowledged that the gas industry, which still bases so much of its production on the nineteenth-century processes which have served it well in the past, is in need of some new ideas." . . . From the Select Committee's Report on the Gas Industry.

"We must remember when talking of going into the Common Market that those already in it will come here and it is going to be a hard fight." . . . MR W. J. RUSTON, chairman, Ruston and Hornsby Ltd.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, August 22

	£ per ton	Weekly change £
COPPER, standard class A (settlement) ...	232	+1½
" (3 months)	235	+1½
LEAD, refined pig, 99·97% purity (cash)	64½	−½
" (3 months)	65½	−¼
TIN, refined, min. 99·75% purity (settlement)	947½	+5½
(3 months)	957½	+5½
ALUMINIUM, ingots 99·99·5% ...	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	198½	—
SILVER (Troy oz)	79½d	+½d

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	75½	−1½
" (3 months)	76½	−1½
RUBBER, per lb No. 1, RSS, spot	25½d	+½d
c.i.f. basis, ports, Oct. ...	25½d	+½d
ARMOURING: Galv. Steel Wire (0·104 in.) ...	68½†	−½
Mild Steel Tape (0·04 in.) ...	53½*	—
NICKEL (home)	660	—
MERCURY (76 lb flask)	63	—
AMERICAN PRICES: Copper, electrolytic (per lb) ...	31c	—
Lead (New York)	11c	—

* *Tape Price, now an average, includes varnishing* † *As from 16 August*

LARGE CONTRACTS AWARDED

A $3 million contract for radio and multiplexing equipment for a microwave network linking five towns in Peru has been awarded to the General Electric Co. Ltd. The network, comprising ten terminal and 54 both-way repeater equipments, will be the longest in South America, extending for 1,100 miles along the Pacific seaboard.

AEI Ltd. have received a £57,000 order from the Admiralty for the supply and installation of two "satellite" telephone exchanges in the Portsmouth Dockyard area. A 400-line PABX is to be provided for Eastney Royal Marine Barracks, and a 600-line exchange of the same type for naval establishments at Gosport.

CONTROL equipment for the South of Scotland Electricity Board's Kincardine "B" power station is to be supplied by Brookhirst Igranic. Main items on the contract are switchboards and mimic diagram panels for the fly-ash extraction plant.

WORTH nearly £50,000, the complete electrical equipment of eight harbour cranes for Amsterdam is being supplied by Metal Industries (Europe). The control panels will be made by Brookhirst Igranic at Bedford and the motors by Lancashire Dynamo at Trafford Pk.

Clydesdale Hopes for 7s 6d Bid

HEARING that an offer worth 7s 6d in the £1 may be received from a source as yet unnamed, creditors of Clydesdale Supply Co. have again deferred a decision on liquidation. Craibstone Investments, who earlier made a 5s offer, are also adopting a wait-and-see policy. In the meantime, creditors were told at a meeting in Glasgow this week, the chain is losing about £7,500 weekly.

Heat Transfer Conference

AUTHORS from 14 countries, including USA and Russia, will present 124 papers at a conference on International Developments in Heat Transfer to be held at Central Hall, Westminster, from 8 Jan. to 12 Jan., 1962. Basically, the conference will deal with fundamental aspects of heat transfer, but there will also be papers devoted to technology and others covering such fields as nuclear energy and aeronautical sciences. The conference, which is jointly arranged by the Institution of Mechanical Engineers, the Institution of Chemical Engineers and the American Society of Mechanical Engineers, will repeat a similar conference taking place next week in Boulder, Colorado.

News in Brief

Annual dinner dance of the Electrical Contractors' Association of Scotland is to be held at Grosvenor Restaurant, Glasgow, on 25 Oct. Principal guest will be Lord Craighton, Minister of State for Scotland.

MANWEB and EDA have a comprehensive display of electrical applications to horticulture at the Southport Flower Show this week.

Canopies incorporating infra-red heating, fronting a continuous shopping area, are part of a £500,000 redevelopment plan for the centre of Derby.

The Birmingham Electric Club have arranged an autumn golf meeting at Blackwell Golf Club on 27 Sept.

The autumn meeting of the ETCTA will be held on 8 Sept. at the Feathers Hotel, Broadway, S.W.1, at 7.15 p.m.

Imhofs will have two mobile exhibition vehicles on the Continent next month —one in Amsterdam and one in Copenhagen—showing their instrument case racks, consoles and accessories.

Lofthouse Colliery, Yorks, is being fitted with electric winding gear after 100 years of steam.

All houses built in future by Boldon UDC, Co. Durham, will be fitted with electric cooker circuits.

The London and Home Counties Regional Advisory Council for Technology have issued a Bulletin of courses for the autumn term, price 3s 6d.

OVERSEAS NEWS

from our correspondents abroad

CANADA

HE Plant

In addition to the 300 MW thermal power station to which we referred last week, the Shawinigan Water and Power Co. is also to begin work on a 113,500 kW hydro-electric plant at Des Coeurs, on the Upper St. Maurice River, some 200 miles north of Three Rivers. Construction is to be carried out by Shawinigan Engineering Co.

W. INDIES

Bank Loan

The World Bank has approved a loan, equivalent to $23\frac{1}{2}$ million, to Trinidad and Tobago to help finance the construction of a 100 MW thermal power station at Port of Spain, the construction of a 41-mile natural-gas pipeline to supply fuel to the plant, and the expansion of transmission and distribution facilities. The projects are for the Trinidad and Tobago Electricity Commission, now the sole public power authority in the territory, whose electricity sales over the past five years have shown an average increase of 17·5% annually. The loan is for a term of 20 years and bears interest at the rate of $5\frac{1}{4}$% annually, including the 1% commission which is allocated to the Bank's special reserve. The new thermal power station, to which we have earlier referred, will have an initial capacity of 100 MW, but will be designed for an ultimate capacity of 220 MW. The 41-mile pipeline from the oilfields at Penal will be 16 in. in diameter and will supply natural gas for the Commission's existing and new power plants at Port of Spain. The well-head cost of natural gas will be about one-third of the cost of fuel oil, the only other available fuel. Total cost of the project is estimated at the equivalent of $37·7 million, and the Bank loan will cover most of the foreign exchange requirements.

ARGENTINA

El Cadillal Project

A preliminary agreement for the construction of the El Cadillal multi-purpose project has been signed by representatives of the English Electric Co. and Richard Costain Ltd., it is reported from Buenos Aires. The project has been under consideration for many years and construction of a dam was begun in 1947, under the Peron regime, but when half-finished work was stopped. It will provide additional power, irrigation and fresh water supplies to San Miguel de Tucuman.

EUROPE

Rhine Station

Construction work has just started on a new hydro-electric project at Säckingen, on the Rhine. Representing the last stage in the utilisation of the waters of the Rhine between Schaffhausen and Basle, along the German-Swiss frontier, the station will have five generators and provide an estimated annual output of 400 million units, to be shared equally between Switzerland and Germany. Total estimated cost is 190 million Swiss francs.

AFRICA

Victoria Falls Plans

Two plans for further power development at Victoria Falls, estimated to cost £$5\frac{1}{4}$ million, are being considered at Livingstone. The more ambitious plan would involve the construction of a 100 MW hydro-electric plant in the fifth gorge below the falls, estimated to provide an annual output of 800 million units. Adoption of this plan hinges on a decision for a fertiliser factory at Livingstone and whether its method of manufacture is to involve electrolysis of water. The Victoria Falls Electricity Board has already carried out technical investigations of the gorges, and it is starting exploratory drilling in the third and fifth gorges. The existing power station is situated at the junction of the third and fourth gorges. The alternative and smaller plan, which would be adopted if the fertiliser factory uses the coal extraction system of manufacture, would involve an extension of the existing power station.

Cooker for Natives

Electricity sales in Kenya during 1960 by the East African Power and Lighting Co. increased by 13·49% to over 335 million units, and internal sales by the Tanganyika Electric Supply Co. amounted to 111·3 million units, an increase of over 9%. Some 170 miles of power line of various classes were added to the Kenya systems during the year, including a 33 kV line from Nakuru to Thomsons Falls. There is a steady increase in off-peak water pumping for irrigation—some $5\frac{1}{2}$ million units were sold for this purpose in 1960 compared with 3·3 million in 1959. In the domestic sphere, particular attention is being paid to developing sales of cooking and other equipment in the high density residential areas. A new low-priced cooker, specially designed for the East African market and developed by the General Electric Co., permitting traditional Asian methods of cooking, is proving very successful. On the staff side, a new training school is to be built at Nairobi, with classrooms for 110 students and dormitory accommodation for 80 residents.

HE Survey

Three German technicians have arrived in Freetown to investigate the possibility of constructing a hydro-electric power plant in Sierra Leone. They plan to visit the Bombali, Port Loko and Tonkolili districts, where they will survey the Mabali, the Little Scaries, Seli and Pampana Rivers. They are also to investigate the Bumbuna Valley, near Magburaka.

INDIA

Five Year Plan

Total installed generating capacity in India in 1966 at the end of the third Five Year Plan is estimated at 11,800 MW compared with 5,800 MW at the end of the second Plan. This large expansion is envisaged to meet the needs of industrial expansion and railway traction schemes also included in the third Plan, final details of which were presented in the Lok Sabha this month. Of the total installed capacity planned for 1966, 4,750 MW will be hydro-electric, 6,500 MW steam plant and 300 MW nuclear plant. Due to foreign exchange difficulties, installed capacity at the end of the second Five Year Plan, 1956-61, has not reached the original target and, in order to avoid severe power shortage over the next few years, measures have been taken to provide foreign exchange for implementing the remaining power schemes which had been originally regarded as "non-core" projects. A switchgear testing station is being set up at Bhopal to test and develop designs of switchgear, and it is proposed that the State electricity boards and the Central Water and Power Commission shall undertake systematic surveys of prospective loads in the various regions. Further linking of State grid systems is also proposed. It is anticipated that despite the completion of the Bhopal plant factory, much of the equipment required will have to be imported.

JAPAN

Line Erection by Balloon

After rockets and helicopters, balloons have now been used in the erection of a transmission line across water. The Kansai Power Co. and the Shikoku Power Co. jointly undertook this project involving the crossing of the turbulent Naruto Straits to link Shikoku with Awaji Island in the Inland Sea, where the flow reaches 20 k.p.h. More than 80 balloons, each 2·5 metres in diameter, were attached at 20 metre intervals to a 9 mm wire towed across the sea, for connection to towers on either bank. That wire was later used to draw a 12 mm wire across, which, in turn, is being used to pull into place four 35 mm aluminium alloy wires. The task is scheduled for completion next month, when the Shikoku Power Co. propose to transmit some 30 MW to the island via the link.

Company Activities

DAWDLING, idle days in Throgmorton Street. Storm clouds still over Berlin but the London Stock Market pays little heed. Our trade "gap" at £31 million for July went against £21 million in June but the equity index moved up a little on the continuing fall in imports. Colvilles, the Scottish steel giant, finds that 84·8% of its £15·3 million "rights" issue is left with the underwriters. The index sinks a point or so. This is the listless state now of the market and, unless the trustees and institutions return in force, no wild activity is likely to set the pulses of price-reading investors racing at dangerous tempos.

Likewise in the electrical market, which last week was a particularly lifeless place, AEI started off at 35s 9d, dropped to 35s, went as high as 36s and then closed the week at 35s 3d. English Electric over the period eased back from 31s to 30s 3d while GEC, despite the $3 million Peruvian contract to supply radio and multiplexing equipment for a microwave network, came back from 29s 9d to 29s 3d. Decca's 10s Ordinary shares fluctuated between 65s and 63s before closing at 63s 9d, although Elliott-Automation managed a climb from 34s 1½d to 34s 9d and Dimplex, at one time down to 72s 9d, rose over the week from 75s to 77s 3d.

Plessey, after its takeover bids for Automatic Telephone and Electric and Ericsson Telephones, was again in the news with the announcement that it has bought Philco Corporation's 49% interest in Semiconductors. The company now becomes a wholly owned Plessey subsidiary. The company was first set up in 1957 and a specially designed factory was built in Swindon for the manufacture of transistors. Plessey's 10s Ordinary shares at 51s 6d, however, showed no initial response to the news nor did they move on the figures issued by the British Radio Equipment Manufacturers' Association which indicate that radio sales this year will prove to be well in excess of those achieved in 1960. Over the first five months of 1961 deliveries of radios at 823,000 were 22% up on the like period of last year. Behind the boom, of course, is the sweeping attraction of transistorised sets. It is a less happy tale for television receivers. During the first five months deliveries from the factories at 549,000 were 14% down on the corresponding period of 1960. It is now up to the trade to produce a pocket-sized TV set—before the Japanese!

Word, too, from Mr J. C. Wilkins, chairman of Wilkins and Mitchell, the makers of "Servis" washing machines and power presses, knocked the company's 5s Ordinary shares back 4½d a time to 8s 4½d. Mr Wilkins points out that with a reducing home demand, which the Government's restrictions have brought about, their domestic appliance division cannot compete so effectively in export markets. Their machine tool division has a good order book and prospects here would normally be good although there is now a considerable risk that new orders will be more difficult to obtain due to the stringency on finance for capital purposes in the UK. Our membership of the Common Market cannot come too soon!—*From our City Correspondent.*

E. Africa Power and Lighting

The drought in Kenya and Tanganyika has reduced hydro output and necessitated some additional thermal generation. Nevertheless, with the year more than half over, Mr A. J. Don Small, chairman and managing director, expects profit to be similar to last year, when net revenue stepped up from £987,143 to a record £1,169,922. Demand has been well maintained, he adds.

Year to 31 Dec.	£ Operating Surplus	£ Net to Parent	% on Ord.		Ord. Price	
			Earned	Paid	High	Low
1956	1,499,798	602,050	10·3	7½	21/3	18/6
1957	1,753,370	740,353	13·1	8	21/9	18/6
1958	1,777,520	772,009	13·3	8	23/3	17/6
1959	1,949,453	923,270	14·3	10	23/6	17/9
1960	2,199,593	1,082,507	16·2	10	20/7	12/9

On the political situation, Mr Small says Tanganyika appears to be moving towards a benevolent dictatorship of a single party, the leaders of which have already given verbally those guarantees which are lacking in Kenya. The new government in Tanganyika appears to be creating those conditions of stability which enable the electrical industry, in common with others, to look forward to a period of steady development.

Firth Cleveland

Because of a change in market conditions, directors have shelved intentions of raising more permanent capital at this stage. Instead, they will rely on short-term finance, supplies of which, it is understood, have been assured.

Mann Egerton

Because of the diversity of the group's activities in motor, electrical and general engineering, the intention to make a debenture issue to finance expansion is bound to raise a certain amount of speculation as to what form that expansion will take. Judging by the interim report in June, this may well be in the electrical departments as long-term prospects here were regarded as "promising." Coachbuilding and woodworking have also been active, however. The lean patch which the car industry is experiencing suggests that the expansion may not be on this side. General engineering had not, as yet, made any profit contribution. Meetings have been called for 12 Sept. in connection with the financial plans. One of the things to be tidied up relates to preference holders, who under the present articles can veto debenture issues; they will be offered a cumulative dividend of 8% instead of a combination of 6% cumulative and 2% non-cumulative as compensation for surrendering this right.

Nuclear Investment

Shareholders took up only 18% of the recent one-for-one issue of 5s shares, even though the issue price of 8s 6d represented only 90% of net asset value. The underwriters have placed the remainder with "private investors wishing to acquire them as a long-term investment." Most of the portfolio is in electronics, but perhaps the name of the company does not help in the present context.

Parmiter, Hope and Sugden

Increased output by the parent company was mainly responsible for the profit recovery in the past year, Mr Eric Sugden discloses in his chairman's address. Production reached 98% of an ambitious target figure. An encouraging pointer for the current year is that the ordering rate at the end of 1960-61 was 112% of target. If the ordering rate is sustained, the board are confident as to immediate prospects. Skilled labour costs are one difficulty and the general picture is not so rosy in the J. F. Collier subsidiary, which incurred a considerable loss in the first half, though this was partly offset in the last six months.

Walker, Crosweller and Co.

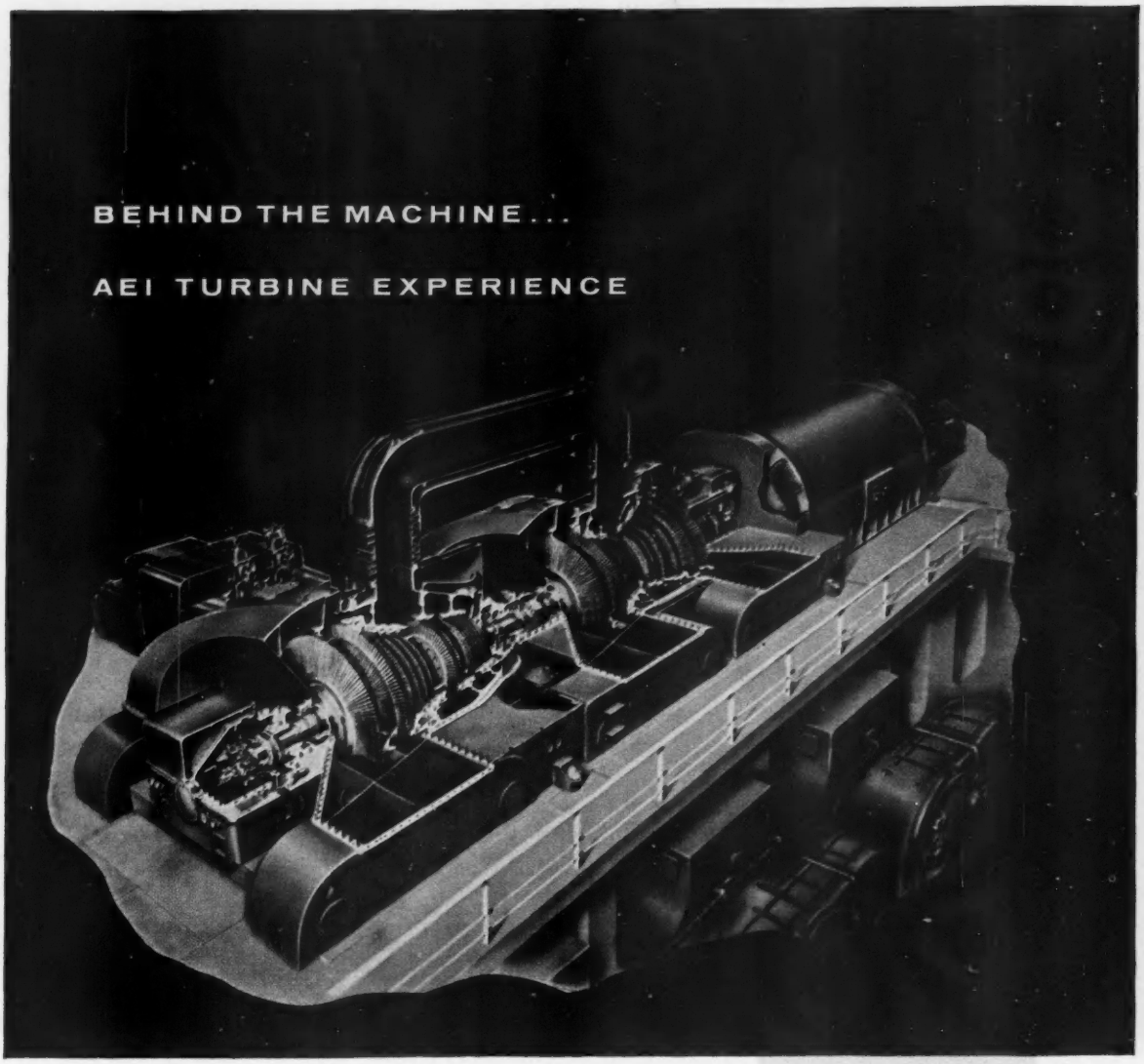
Makers of "Leonard" thermostatic mixing valves, "Unatap" spray mixing taps and "Arkon" gas and air flow recorders and indicators and other instruments, this business is seeking Stock Exchange listing. Accordingly, lists open and close today for 30% of the £250,000 issued capital in 5s Ordinary shares, after which the Walker family will continue to own about 70% of the capital. At the offer price of 8s 6d per share, the business is being valued at £425,000 against net assets of £362,000, but dividend forecast is 12½%.

Wilkins and Mitchell

A problem which must be engaging other appliance makers is highlighted by Mr J. C. Wilkins in his annual review. This is: how to readjust operations in order to reduce costs, without impairing the ability to expand production again if, and when, the market improves. He does not give any answer, but says that increased costs resulting from the latest Government restrictions cannot be absorbed. Last year, including results of the overseas companies, the Appliance Division made only a small profit.

Dividend Announced

Sun Electrical. Interim 5% *(same).*



NUCLEAR POWER PLANT TURBINES

The ideal design of a turbine for use in nuclear power differs considerably from that in a conventional station. In the latter the trend is towards larger and larger individual units operating at steam conditions, rising, in the case of one unit being built by AEI, to 3500 psig (supercritical pressure) and 1100°F.

In a nuclear plant, despite progressive attainment of increased coolant temperatures, the nature of the reactor places a restriction on steam temperature and turbines must be designed to handle greater quantities of steam at lower conditions.

Such turbines must be larger than similarly rated conventional machines and the provision of an adequate exhaust area is a problem. It is overcome in AEI machines by the use of their well-known multi-exhaust system.

An AEI turbine-generator built for Berkeley Nuclear Power Station. This unit is an 83 MW, 3000 r.p.m. 2-cylinder mixed pressure turbine. H.P. steam at 310 p.s.i.a. and 604 deg. F. is expanded through six stages and is then mixed with L.P. steam at 64 p.s.i.a. and 596 deg. F.

For further information, contact your nearest AEI office or write direct to AEI Turbine-Generator Division

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INS. 59

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

24 Aug.—Hoylake U.D.C. 208 140 W sodium lamps/gear for Group "A" conversion scheme.—Advertised 3 Aug. issue.

25 Aug.—Watford B.C. Electrical work in central library extension. Applications to Borough Engineer and Surveyor, F. C. Sage, Town Hall, by above date.

26 Aug.—Alfreton U.D.C. Installation of 179 lighting units.—See 17 Aug. issue.

26 Aug.—Ballinasloe (Co. Galway). Electrical installation in Ballinasloe Mental Hospital new dining hall and renovations to existing hospital in the Pines Division.—See 17 Aug. issue.

26 Aug.—Sutherland C.C. Supply and erection of 19 street lighting units along A9. County Architect, E. W. Brannen, Dornoch.

28 Aug.—Birmingham C.C. Lighting, power and heating installations in tenants' rooms at: contract T50/8, Bottetourt Rd, Birmingham 29; and contract T50/17, Ley Hill, Holloway.—See 10 Aug. issue.

28 Aug.—E. Devon Water Board. Duplicate pumps.—See 17 Aug. issue.

28 Aug.—Lancashire C.C. Rewiring of Ashton-under-Lyne Stamford Boys' County Secondary School. County Architect, P.O. Box 26, County Hall, Preston. Applications by above date.

28 Aug.—Liverpool C.C. Supply: cables, lamps, sundries and scientific electrical engineering equipment.—See 17 Aug. issue.

28 Aug.—Manchester C.C. Electrical installations in workshop and foundry extensions at Openshaw College of Further Education.—See 17 Aug. issue.

28 Aug.—Manchester C.C. Passenger lift at "Heyhead View" aged persons' home, Wythenshawe.—See 10 Aug. issue.

28 Aug.—N. Ireland Hsg. Trust. Electrical installations in 22 Elmwood Rd, Londonderry, dwellings. Trust Offices, 12 Hope St, Belfast 12.

28 Aug.—Renfrew C.C. (Contract 2). Electrical installation, including under-floor heating in the replacement of Johnstone High School. Applications to County Clerk, R. Urquhart, County Bldgs, Paisley, by above date.

28 Aug.—Romsey U.D.C. Supply and erection of six lighting columns and ancillary equipment. Surveyor, Council Offices, 3 Bury Rd, Romsey, Hants.

28 Aug.—Standish with Langtree U.D.C. Supply of 70 60 W sodium lanterns and 18 15 ft concrete columns. Engineer and Surveyor, H. Knowles, Ashfield Hse.

28 Aug.—Welwyn Gdn City U.D.C. 82 steel lighting columns/lanterns and removal of existing columns.—See 3 Aug. issue.

29 Aug.—Cardiff C.C. Passenger lift in aged persons' home, Newborough Ave.—See 3 Aug. issue.

29 Aug.—Cardiff C.C. Electrical installation, on fixed-price basis, in Brynydon Approved School extensions.—See 10 Aug. issue.

29 Aug.—Dublin C.B.C. Supply: 40 columns; post-top lanterns; cable; fuse boxes.—See 10 Aug. issue.

30 Aug.—Chester C.C. Contract 603. Supply and erection of seven 12 in. diameter mixed flow wet well pumps capable of 3,000 g.p.m. at 40 ft head, togther with motors and switchgear. Pumps to be driven by diesel engines also required. Applications to City Engineer, 49 Northgate St, by above date.

30 Aug.—Hayes and Harlington U.D.C. Group "B" steel lighting columns.—Advertised 10 Aug. issue.

31 Aug.—Bala U.D.C. 13 Group "A" steel columns and six wall brackets with 250 W mercury lamps/lanterns/gear.—Advertised 10 Aug. issue.

31 Aug.—Enniskillen. Electrical installation in proposed St. Michael's Grammar School extensions.—See 10 Aug. issue.

31 Aug.—Hants C.C. 13, 35 ft steel columns complete with 200 W or 280 W sodium lighting for Bullington A303/A34 roundabout.—See 17 Aug. issue.

31 Aug.—Lisburn. Rewiring of lighting and heating installations in Railway St Presbyterian Church.—See 17 Aug. issue.

1 Sept.—Belfast C.C. 33 kV switchgear, together with modification of existing plant.—Advertised 3 Aug. issue.

1 Sept.—East Riding C.C. Electrical services installation in proposed Cottingham (Bacon Garth) Infants' School.—See 17 Aug. issue.

1 Sept.—N. Armagh Hospitals. Electrical work in Lurgan and Portadown Hospital alterations and additions.—See 3 Aug. issue.

1 Sept.—Thurrock U.D.C. Erection of columns included in road improvements, Heath Rd and Long La.—See 27 July issue.

4 Sept.—Chatham B.C. 1,080 Class "B" lighting units.—Advertised 10 Aug. issue.

4 Sept.—Enniskillen R.D.C. Provision of 159 fluorescent street lighting points. Engineer and Surveyor, A. Stephenson, Cornagrade, Enniskillen.

4 Sept.—Flint C.C. Columns, lanterns/lamps/fittings for Queensferry By-pass lighting. County Surveyor, Llwynegrin, Mold.—Advertised 17 Aug. issue.

4 Sept.—Gt. Yarmouth C.B.C. 2,000 g.p.m. at 45 ft head sea water pumps for use at swimming pool.—See 10 Aug. issue.

4 Sept.—N. Ireland E.B. Main generator/generator transformer connections for No. 4 60 MW turbo-generator.—See 6 July issue.

4 Sept.—Rochdale C.B.C. Rewiring of lighting and power installations in Oakenrod Primary School.—See 17 Aug. issue.

4 Sept.—West Riding C.C. Maintenance of roundabout and traffic island lighting. County Engineer and Surveyor, County Hall, Wakefield.—Advertised in this issue.

5 Sept.—Athlone U.D.C. Two pumps with capacity of 11 cu ft p.m. for main drainage pumping plant.—See 3 Aug. issue.

5 Sept.—Cardiff C.C. Electrical installation in Adamsdown County Primary School.—See 10 Aug. issue.

5 Sept.—Cardiff C.C. Electrical installation, on fixed-price basis, in Leckwith Technical High School, Lawrenny Ave. Details from W. S. Atkins and Ptnrs., 6 Park Pl, Cardiff. Deposit £2 2s, made payable to Corpn. N.I.C. firms only.

5 Sept.—Oldbury B.C. Supply and erection of 154 Class "B" concrete columns; supply and fitting of G.E.C. post-top lanterns/lamps/gear/time switches. Borough Engineer and Surveyor, Municipal Bank Chmbrs. Deposit £2 2s.

5 Sept.—West Riding C.C. Installation of road lighting at Tadcaster Toulston Lodge Secondary School.—See 10 Aug. issue.

6 Sept.—Preston C.B.C. Contract 8. Electrical installations, on fixed-price basis, in eight shops, 13 maisonnettes and branch library, Savick estate.—See 17 Aug. issue.

6 Sept.—Staines U.D.C. Supply and erection of 190 Group "A" steel columns with 250 W mercury lanterns/lamps/gear; 190 Group "B" steel columns with 100/150 W tungsten lighting plus resiting work with new lanterns, etc.—Advertised 10 Aug. issue.

7 Sept.—Belfast C.C. (b) Electrical installation in Somerdale Boys' Secondary School, Somerdale Pk.—See 17 Aug. issue.

7 Sept.—Glasgow C.C. Supply of 5,000 mild steel bracket fittings for stair lighting. Lighting Dept., 20 Trongate.

7 Sept.—Belfast C.C. Electrical installation, Diagnostic Centre.—See 10 Aug. issue.

8 Sept.—Rothwell U.D.C. Scheme 1: nine 140 W sodium units; Scheme 2: 229 45/60 W sodium units with side entry lanterns; Scheme 3: 232 45 W sodium units with post-top lanterns. All three scheme tenders: (a) provision and erection; (b) supply only; (c) erection only. Engineer and Surveyor, Civic Bldgs, Rothwell, near Leeds. Deposit £2 2s.

8 Sept.—Stockton-on-Tees B.C. Supply of: (a) 13 Group "A" reinforced concrete columns and (b) 13 140 s.v.d. lamps, lanterns/gear.—Advertised 17 Aug. issue.

9 Sept.—Prescot U.D.C. 54 "A.E.I. Kirby" lanterns mounted on 15 ft "Concrete Utilities" columns, together with lamps/gear along various roads.—See 17 Aug. issue.

9 Sept.—Wexford C.C. Electrical installation in public health clinic, Enniscorthy.—See 10 Aug. issue.

11 Sept.—Newcastle under Lyme B.C. 35 Group "A" 200 W sodium lighting units, including conversion fittings for existing columns, etc., for A52 Tarporley/Tarvin trunk road.—Advertised 17 Aug. issue.

11 Sept.—N. Ireland. Standby generating set for Ministry of Home Affairs, Radio Workshops, Lislea Drive.—See 10 Aug. issue.

11 Sept.—Thurrock U.D.C. Applications for inclusion on select list for electrical work to Engineer and Surveyor, C. S. H. Hawkes,

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 108 queries answered this week

"Transtar" fluorescent control gear—makers of?—W.B.—Inductive Appliances Ltd., St. Nicholas St, Newcastle upon Tyne.

"Clukes" clippers—makers of? E.B.—Clukes Ltd., 215 Putney Bridge Rd, S.W.15.

"Hotric" water heaters—address for? S.E.B.—George Pearson (Engrs.) Ltd., 208 Chingford Mount Rd, E.4.

"Polkris" babies bottle warmers—address for? E.H.—Miller Gwynne Sales Ltd., 112A Junction Rd, N.19.

Handryers—makers of? G.P.—English Electric Co. Ltd., E.E. Hse, Strand, W.C.2; Bylock Electric Ltd., 109 South St, Ponders End, Middx; Acru Electric Tool Mnfg. Co. Ltd., 123 Hyde Rd, Arwick, Manchester; Quiz Electrics Ltd., 160 High St, Teddington; M. and J. Lossos and Co. Ltd., 31 Beethoven St, W.10; Crypto Ltd., North Circular Rd, N.W.10; Metway Electrical Industries Ltd., Kemp Town, Brighton; Photoelectronics (M.O.M.) Ltd., 63A Kingston Rd, S.W.19; J. Broughton and Sons (Engrs.) Ltd., Pershore Rd South, Birmingham 30.

"Powermaster" refrigerators—repairers of? T.E.—Raymond Ball (Shirley) Ltd., 826 Wickham Rd, Shirley, Croydon.

FURTHER ANSWER

"Therglass" heated glass—makers of? C.P.—Young and Power Ltd., 42 Spring Gdns, Manchester 2.

Council Offices, Palmer's Ave, Grays, by above date. N.I.C. and E.C.A. firms only. —Advertised in this issue.

11 Sept.—Uxbridge B.C. Rewiring of lighting circuits and power installations in: contract 111: 150 houses, Hillingdon; contract 112: 152 houses, Hillingdon; and contract 113: 130 houses, Cowley.—Advertised 17 Aug. issue.

11 Sept.—Portland U.D.C. Electrical work in connection with the installation of pumping plant. Water Engineer, Council Offices. —Advertised in this issue.

12 Sept.—Sunderland C.B.C. Electrical installations in 209 Town End Farm estate dwellings. Borough Architect, Grange Hse, Stockton Rd.

14 Sept.—Sunderland C.B.C. Electrical installations in (a) Training College extensions and (b) Hylton Red Hse Community Centre. —Advertised 17 Aug. issue.

15 Sept.—Co. Armagh. Electrical installations in Crossnaglen Voluntary Intermediate School and school meals accommodation. Details from Varming and Mulcahy, 37 Malone Rd, Belfast 9. Deposit £5 5s.

16 Sept.—Cheshire C.C. Applications for inclusion in select list for electrical engineering work to District Architect, Remenham, Alderley Rd, Wilmslow, by above date.

16 Sept.—East Barnet U.D.C. Contract 953. (a)(i) Supply and erection of 60 30 ft steel columns/brackets; (a)(ii) removal of 55 existing mercury lanterns and uprooting of 62 steel trolley poles; (b) supply and fitting of 60 200 W linear sodium lamps/lanterns/gear; (c) wiring for A1000 Gt. North Rd lighting. Engineer and Surveyor, Town Hall, Station Rd, New Barnet. Deposit £2 2s.

16 Sept.—Morley B.C. 52 140 W sodium street lighting units on 25 ft concrete columns (22 columns to support o.h. wiring) along A62.—Advertised 17 Aug. issue.

18 Sept.—E.B. for N. Ireland. Specification N.I.1638. Supply of two 200 kVA and two 300 kVA 3·3/0·4 kV transformers for Coolkeeragh Power Station.—See 27 July issue.

18 Sept.—Poyton-with-Worth P.C. 55 concrete columns and sodium lanterns for Class "A" street lighting.—Advertised 17 Aug. issue.

19 Sept.—Musselburgh B.C. Supply and erection of 13 15 ft and 15 25 ft concrete columns and for installation of mercury and sodium lighting along Eskside East and Pinkie Rd. Burgh Surveyor, Municipal Offices.

2 Oct.—Manchester C.C. Water valves, including electrically operated types for Dunham Pk Reservoir. Secretary, Waterworks Offices, Town Hall.

CONTRACTS PLACED

Cardiff T.C. Provision of electrical services in new Canton Sub-Divisional Police Station, J. M. Donaghue Ltd., £1,999. Recommended.

Ilford B.C. Supply of: 159 200 W sodium lamps/lanterns/gear, £2,404, and 68 mercury lanterns, £857, Atlas Lighting Ltd.; 27 steel columns, Stewarts and Lloyds Ltd., £5,466. Recommended.

Islington B.C. Electrical work in City, Queens and Avenell Mansions, Evans and Shea Ltd., £11,920. Recommended.

Leeds C.C. Provision of 13 A socket outlets in 21,706 dwellings, Yorkshire E.B. Recommended.

Margate T.C. Supply of 94 "Amberline" sodium lanterns 200 W lamps/gear for Canterbury Rd widening scheme, Associated Electrical Industries Ltd., £1,527 10s. Supply 748 time switches, Sangamo Weston Ltd., £3 17s 6d each. Recommended.

Metropolitan Water Board. Supply and setting to work of pumps, motors, pipes, valves, etc., for Hammersmith Wks, Hathorn, Davey and Co. Ltd., £15,511. Supply of two 50 b.h.p. motors/starters for Cheshunt Pumping Station, £1,313.

Nottingham C.C. Supply of: 400 c.i. columns, Smedley Bros. Ltd.; 500 Group "B" lanterns, Wardle Eng. Co. Ltd.; swan necks, A. C. Ford Ltd.; 170 Group "A" and 80 Group "B" sodium lanterns/gear, Eleco Ltd.; lamps, General Electric Co. Ltd.

Scarborough B.C. Rewiring and additional installations in 168 Northstead estate houses, Goods of Scarborough Ltd., £6,726.

Wessex Hospital Board. Electrical work in: neurosurgical unit pathological laboratory, Southampton General Hospital, B. French Ltd., £7,325; artificial limb, etc. centre, St. Mary's Hospital, Portsmouth, B. French Ltd., £3,212; Coldharbour Hospital, Sherborne, H. W. Smith and Son, £2,159; psychiatric unit, Hursley Rd Sanatorium, Winchester, B. French Ltd., £3,351. Lift installations: Knowle Hospital, £8,422, and Southampton General Hospital, £3,776, Keighley Lifts Ltd. Recommended.

16 Oct.—E.B. for N. Ireland. Contract N.I.1621. Low pressure pipework and valves at Coolkeeragh.—See 17 Aug. issue.

No date stated—N. of Scotland H.E.B. Supply of 16·5 MVA 132/11 kV transformer and auxiliary transformer for Nant Power Station.—Advertised 17 Aug. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

29 Aug.—Egypt. Meters. Ministry of Wks, Cairo, Electricity and Gas Administration. Embassy of the U.A.R, Commercial Bureau, 24 South St, W.1. B.o.T. (ESB/26188/61).*

5 Sept.—America. (1) Power transformer, 14·4 kV, 1,200 A air-break interrupter switch and bus structure; (2) distribution boards, fire control cabinets and battery chargers. U.S. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center, Denver. B.o.T. (1) (ESB/26164/61)* and (2) (ESB/25855/61).*

5 Sept.—Australia. 1·5 kV train pantographs. Secretary, Victoria Railways, Melbourne C.I. (B.o.T. (ESB/26722/61).*

10 Sept.—Iraq. Lamps. Secretary, Central Foreign Purchase Committee, Ministry of Finance. B.o.T. (ESB/26168/61).*

11 Sept.—Australia. 84 1,000 A, 660 V circuit-breakers and 14 blade-type 1,000 A three-phase isolators. Secretary, H.E. Commission, Elizabeth St, Hobart. B.o.T. (ESB/26192/61).*

11 Sept.—S. Africa. 8,000 10-pair terminal blocks. Chairman, Tender and Supplies Board, 291 Bosman St, P.O. Box 371, Pretoria. B.o.T. (ESB/26147/61).*

16 Sept.—Iraq. Switches and aerial fuses. Accounts Section, Directorate General of Municipalities. B.o.T. (ESB/26173/61).*

19 Sept.—Pakistan. 11 kV distribution lines. West W.A.P.D.A, Lahore. B.o.T. (ESB/26130/61/DLF).*

21 Sept.—India. Two 3 MVA, 33/11 kV transformers for Nainj substation. Director of Designs, Rihand H.E. Design Directorate, 10/499 Allenganj, Kanpur. B.o.T. (ESB/26408/61).*

21 Sept.—New Zealand. Humidistats, room and duct thermostats. Director-General (Stores Division), G.P.O., Wellington. B.o.T. (ESB/26488/61).*

9 Oct.—Nigeria. Two 3 MW diesel-alternators, heavy fuel treatment plant, engine room crane, etc., for Kaduna Power Station. Details from consulting engineers, Preece, Cardew and Rider, 12 Queen Anne's Gate, S.W.1, fee £15 made payable to consultants. —Advertised in this issue.

20 Oct.—India. Tender GT./MT./61/18. Drilling and grinding machines, shears, forging and hydraulic presses, power presses, auto-notching press for large rotors, spark erosion machine, guillotine and single-spindle moulding machines. Shri D. P. Guzdar, Officer on Special Duty, Heavy Electricals Ltd., Crown Hse, W.C.2. B.o.T. (ESB/24903/61).*

25 Oct.—Costa Rica. 500 kVA (alternatively 1·5 MVA), 33 kV three-phase transformer. Junta Administrativa del Servicio Electrico Municipal de Alajuela, Alajuela. B.o.T. (ESB/26724/61).*

30 Oct.—Ceylon. 11 kV and 33 kV insulators. Crown Agents, 4 Millbank, S.W.1. B.o.T. (ESB/26165/61).*

2 Nov.—India. Engine/alternator sets, auxiliary transformers, batteries, battery chargers, signalling apparatus, lightning arresters, p.v.c. insulated aluminium cable (18 items, various dates). Deputy Controller of Stores, Railway Electrification, 232 Lower Circular Rd, Calcutta. B.o.T. (ESB/24902/61).*

3 Nov.—India. Cable (five items), testers (five items), battery charger, battery, hand blower and water distilling plant. Deputy Controller of Stores, Railway Electrification, 232 Lower Circular Rd, Calcutta. B.o.T. (ESB/24995/61).*

20 Nov.—Australia. Two 200 MW turbo-generators and associated plant for Hazelwood Power Station. Details from Agent-General for Victoria, Victoria Hse, Melbourne Pl, W.C.2. Specification 61-62/3.

TRADE NOTES

Changes of Address. The London-based sales office of Firth Cleveland Ltd. has now been moved to the works at Tipton, Staffs.

The address of the Electricity Council's regional safety officer, North Western Region, is now 23 Tiviot Dale, Stockport, Cheshire. Telephone: Stockport 6684.

As from 28 Aug. the London offices and showroom of Ekco Heating and Electrical Ltd. move to 41-47 Old St, E.C.1 (Telephone: CLErkenwell 7142). In the early autumn it is intended also to provide a trade counter for the benefit of London wholesalers and contractors.

Extension. Austinlite Ltd. have now concentrated the whole of the production of rotary switches and marginal relays at their Malvern factory, where extensions have been completed. A 50% increase in production is planned. Production of Austinlite standby generating plant remains at Crawley.

BEAMA Contract Price Adjustment Formulae. *For Electrical Machinery and Equipment.* For purposes of calculating variations in: *(a)* "Rates of Pay"—the rate of pay for adult male labour at 18 Aug., 1961, shall be deemed to be 213s 6d; *(b)* "Cost of Material"—the index figure for materials used in the Electrical Machinery Industry at 18 Aug., 1961, is 118·8* (184·3*).

For Turbo-generating and Allied Plant. For purposes of calculating variations in: *(a)* "Rates of Pay"—the rate of pay for adult male labour as at 18 Aug., 1961, shall be deemed to be 213s 6d; *(b)* "Cost of Materials"—the index figure for materials used in the Mechanical Engineering Industry at 18 Aug., 1961, is 128·4* (192·9*). "Blast Furnace and Iron and Steel Melting and Rolling (1948 S.I.C. ref. 40/41)." 191·1*. Other Steel Goods excluding tubes (1958 S.I.C. ref. 311/2), 130·2*. The price of brass condenser tubes ¾ in. o/d 18 s.w.g. on 18 Aug., 1961, is 4s 1½d per lb. *Provisional figure.

The figures in parentheses shown above relate to earliest list of wholesale price index numbers in which the year 1949 is taken as the base 100. For the other figures 1954=100.

Agreement. Vickers-Armstrongs (Engineers) Ltd. have concluded a licence agreement for the manufacture of "Formseal" packaging machines at their Crayford, Kent, works. "Formseal," a French invention, has previously been manufactured in France and has been offered for sale in this country by John Kimbell and Co. Ltd. of Vauxhall, S.W.8, who will continue to market the British-built machines.

BUSINESS PROSPECTS

Accrington. The Salford R.C. Diocesan Trustees plan primary school, Sandy La.

Andover. H. C. Janes Ltd., Vigo Rd, proposes 48 dwellings, Vigo estate.

Ayrshire. Western Regional Hospital Board, Sauchiehall St, Glasgow C.2, propose two new 400-bed general hospitals, on sites of Heathfield Hospital, Ayr, and Kirklandside Hospital, Kilmarnock.

Banbury. New wks/depot for Automatic Products Ltd. Contractors: Turriff Construction Corp. Ltd., Budbrooke Rd, Warwick.

Banff. Plans are being prepared for the first stage of extensive developments at Ladysbridge Hospital.

Basildon. Assembly shops, etc., proposed No. 2 industrial area, New Town, for Gilbarco Ltd., 740 High Rd, London N.7. Cost: £150,000.

Bedfordshire. Education Committee award £140,158 contract for Toddington School to J. M. Hill and Sons Ltd., Church St, Ampthill.

Belford. Diocese of Hexham and Newcastle propose new church and presbytery. Architects: Reavell and Cahill, Lloyds Bank Chmbrs, Alnwick.

Birmingham. Proposed: Ward St by Joseph Gloster Ltd., 33-34 Hockley Hill, new industrial premises. Food processing factory planned for Marsh and Baxter Ltd., Brierley Hill; architects: Harry Bloomer and Son, 73 Hagley Rd, Five Ways, Edgbaston. Planned: seven shops with showrooms and stores over at cinema site, Great Bridge, for Baratham Ltd.; architects: J. F. Phillips and Asscts, Birmingham. Proposed: all-purpose welfare centre in Beaufort Rd area, Edgbaston. Regional Hospital Board propose £9,650 bed lift, St. Chad's Hospital.

Blackpool. Stainless Steel Plant Ltd., Cocker St Wks, propose new premises, Preston New Rd.

Blyth. T.C. award contract for 52 flats to R. C. Comb Ltd., Victoria Terr, Whitley Bay.

Camberley. Single-storey factory, Doman Rd, proposed by Ronald Lyon (Estates) Ltd., Hersham, Walton-on-Thames. Development proposed on site of Priars Kitchen Hotel, Frimley St, Frimley, to comprise three-storey shops and offices, a restaurant, a three-storey block of 18 flats/other flats and maisonnettes. Proposed: School of Instruction at Portsmouth Rd for the Women's Royal Army Corps.

Carstairs. The M.o.W. placed contract with Wilson and Sons (Hamilton) Ltd., 82 Townhead St, Hamilton, for a mental hospital.

Chelmsford. Planned: factory, Robjohns Rd, Widford industrial estate, for Cundell, Eve and Co. Ltd. Architect: Raymond Andrews, 19 Queensdale Rd, Holland Pk, W.11.

Chesterfield. R.C. authorities plan two new schools, Birdholme.

Corby. U.D.C. award contract for 25 houses, Hood Court, to Sellick, Nickles and Co. Ltd., Corby.

Darlington. Industrial Estates Management Corp., Gateshead, propose factory additions, Aycliffe. Architects: Fennell and Baddiley, Bridge End Chmbrs, Chester-le-Street.

Dewsbury. Planned: industrial development of four acres, Railway St, Scout Hill, by B.T.C., Marylebone Rd, N.W.1.

Docking R.D.C. Tender: construction of sewage works to include pumping equipment. County Health Engineer, Norwich.

Durham. New ward Dryburn Hospital proposed by Newcastle Regional Hospital Board, Benfield Rd, Newcastle; contractors: M. D. Lilley and Son, Murton. R. Turley and Asscts., 46 Jesmond Rd, Newcastle, architects for proposed N.E. Housing Assen. 100 houses. Durham City. C.C. propose 26 dwellings, Crossgate and 14 Church La; City Engineer.

Edinburgh. B.T.C. propose £5 million redevelopment Waverley Station area; Murrayfield Real Estate Co. to prepare plans. N.C.B., 1 Eglington Cres, propose £200,000 electronic data processing centre, Bankhead Causeway North.

Eltham. L.C.C. plan shopping centre and flats at Eltham High St, S.E.9, to cost £750,000. Architects: R. Seifert and Ptnrs., 34 Red Lion Sq, W.C.1.

Essex. C.C. plan mental health training centre, Loughton, to cost £70,000. County Architect, Chelmsford.

Exeter. University authorities propose new chemistry bldg. Quantity surveyors: Reynolds and Young, 329 High Holborn, W.C.1.

Gateshead. Thomas de la Rue Ltd., London, propose new factory, Team Valley trading estate. Wimpey and Co. Ltd., Fenwick Terr, Newcastle, contractors for £300,000 T.C. flats, Bensgam. R.C. Diocese of Hexham and Newcastle propose new St. Aidan's R.C. Secondary Modern School for 300, Fell Dyke Foot; Diocesan solicitors, Hedley and Thompson, 11 Toward Rd, Sunderland. Alterations and additions proposed Coatsworth Rd, for London and Newcastle Stores Ltd.; architects: G. H. Gray and Ptnrs., 8 Portland Terr, Newcastle.

Hamilton B.C. Tender: 35 flats, Bent Rd/Glebe St. Architect.

Hampshire. C.C. propose six youth centres costing £60,000 at several schools. County Architect.

Hartlepool. Plans by T. H. Turnbull, architect, 6 Scarborough St, West Hartlepool, for replacing factory for Hartlepool Ropery Ltd.

Hastings. Planned: by Turriff Construction Corp. Ltd., 11 South Wharf Rd, S.W.2, for William Still and Sons Ltd., Greville St, E.C.1, factory/offices/canteen/water tower, Broomgrove.

Hawick B.C. Tender: 40 houses, gap sites, Burnfoot, Burnhead. Architects: J. A. W. Grant, 36 Melville St, Edinburgh.

Hebburn. U.D.C. propose 102 bungalows, Ponds site. Surveyor.

Hemel Hempstead. J. Jarvis and Sons Ltd., 239 Vauxhall Bridge Rd, S.W.1, recommended contractors for £1 million Kodak factory, Swallowdale Rd.

Hertford. B.C. propose 32 dwellings, Horns Hill. Surveyor.

Hull. Planned: extensions to factory/offices, Hedon Rd, for Hull Steel Radiators Ltd. Cold store/office, etc., Foster St, for Birds Eye Foods Ltd., Hull. Corporation E.C. plan Frederick Holmes School at revised cost of £104,302.

Huyton with Roby. U.D.C. propose 322 dwellings, Bluebell La estate. Housing director, Huyton.

Inverness. Ian Burke, South Tay St, Dundee, architect for proposed £¼ million redevelopment, Bridge St.

Jarrow. T.C. propose 110 houses, Hedworth estate. H. W. T. Perkins, Borough Engineer.

Keswick. National Trust, Queen Anne's Gate, S.W.1, propose 15 houses near Crosthwaite Vicarage.

King's Lynn B.C. Tender: 152 dwellings various sites. Housing Architect, Queen St.

Leatherhead. Research centre, Downside Estate, proposed for Unilever Ltd., Blackfriars, E.C.4. Chief Engineer: A. W. Nethercott, St. Bridget's Hse, Bridewell Pl, E.C.4.

Liverpool C.C. Tender: extensions to Sudley Rd C.P. School: City architect. C.C. Tender: 176 dwellings in 23-storey block, Harding St; City architect, Dale St.

London. Contract is placed with Dix (Bldrs) Ltd., 24 Eccleston St, S.W.1, for extensions to Queen Charlotte's Hospital, Goldhawk Rd, W.6. Six-storey Livery Hall planned at Fore St, E.C.2, for Salters' Co., 36 Portland Pl, W.1; architects: Easton and Robertson, Cusdin, Preston and Smith, 53 Bedford Sq, W.C.1; cost: £250,000. Shops and offices planned at 47-53 Wandsworth High St, S.W.18; architect: W. Ryder, 21 Bruton St, W.1. Shops and offices planned at 64-68 Camberwell Church St, S.E.5; surveyors: Brecker, Grossmith and Co., 63 Wigmore St, W.1. 15-storey bldg planned on the former Queen's Hall site at Langham Pl, W.1; contractors: Laing Development Co. Ltd., Mill Hill, N.W.7. Pan American Airway, 193 Piccadilly, W.1, propose air terminal and hotel at Lillie Bridge, S.W.6; architects: Lam Biel and Ptnrs., 16 Bryanston St, W.1. Project for bldg offices, etc., Gunnersbury Station, W.4, may cost £1 million; promotors: Rodwell Group of Co's, Hertford St, W.1; architects: Duncan Ptnrs., 9 Hertford St, W.1. L.C.C. propose £221,000 R.C. secondary school at Footscray Rd, Eltham, S.E., for which architects are F. G. Broadbent and Ptnrs., 13 Manchester Sq, W.1.

Lytham St. Annes. Lancashire C.C. plan aged person's home, Highbury Rd.

Manchester. Two factories, Derby St and Stanley St, Cheetham, planned for Byrom Properties Ltd. New premises, Mount St and Peter St, proposed by District Bank Ltd., Spring Gdns, Manchester 2.

Mansfield B.C. Tender: ten traditional bungalows, Ravensdale estate. Engineer.

Middlesbrough. £1·3 million shopping precinct, Dundas St area, proposed by Metropolitan Surplus Lands Co. Ltd. Architects: Cartwright Woollatt and Ptnrs., Nottingham.

Middlesex. County Welfare Committee plan home for 72 old infirm people, Southgate, cost: £115,530 and old people's home, Shepperton, £117,900.

Motherwell. Grampian Properties, have placed contract for £100,000 hotel at Merry St with J. Laidlaw and Sons Ltd., Dalmarnock Rd, Rutherglen, Glasgow.

Newbury. B.C. proposes 42 dwellings various sites. Surveyor.

Newcastle. Convent of The Good Shepherd, Gosforth, propose secondary school, Benton Pk Rd. Architect: D. Brown, 10 Lambton Rd, Jesmond, Newcastle.

North Riding. John T. Bell and Sons, Market St, Newcastle, propose 3,000 houses, Hemington Pk, south of Middlesbrough.

Northumberland. C.C. propose new child welfare centres, Wallsend, Monkseaton and Ponteland, additions to Ashington child welfare centre and junior training centre, Alnwick. C. C. Brown, County Architect, 30 Gt. North Rd, Newcastle.

Oldham. Manchester Regional Hospital Board, Cheetwood Rd, Manchester, plan physiotherapy and rehabilitation department, Oldham Royal Infirmary.

Peterborough. Joint Education Board propose £64,746 extensions to Lincoln Rd Boys' School. Board Architect, Bridge St.

Reading. Planned: oil-fired boiler hse, Basingstoke Rd, for Gillette Industries Ltd. B.T.C., Marylebone Rd, N.W.1, plan rebuilding Reading station.

Rotherham. Proposed: steel making bldg, Aldwarke La, and a central engineering workshop/annexe there, for Pk Gate Iron and Steel Co. Ltd., Rotherham. B.C. propose mental hostel, Park Lea, Doncaster Rd, also hostel for elderly, Kimberworth Pk.

Rugby. Birmingham Regional Hospital Board propose £9,430 bed lift, St. Luke's Hospital.

Sale B.C. Tender: 40 aged persons' flatlets, Roebuck La/Hollins Grove. Engineer.

Salisbury. Two-storey shopping centre at High St/New St planned for the Hammerson Group of Co's, London. Architect: F. Wallace Smith, 84 Crane St.

Scarborough B.C. Tender: 27 houses, Eastfield. Engineer.

Sedgefield. Tarren and Caller, 24 Front St, architects for proposed Hepplewaite Ltd. offices/showrooms, West Cornforth. R.D.C. propose 33 houses, Windlestone pithead site; architect.

Sheffield. Town Centre Securities Ltd. plan shops and supermarket, Attercliffe Rd.

Smethwick. B.C. propose 36 dwellings, Broadmoor Hse and Arden Rd.

Southampton. Showrooms/offices, Brunswick Pl, proposed to plans by W. H. Saunders and Son, architects, 22 Brunswick Pl.

Staffs. C.C. plan mental health centres at Stafford and Newcastle-under-Lyme; a junior hostel and training centre, Leek, and

Business Prospects—continued

adult training centre there; also adult hostels, Leek and Newcastle-under-Lyme. County Architect, Stafford.

Sutton and Cheam B.C. Tender: 24 dwellings, St. Nicholas Rectory site, Sutton. Engineer, Sutton.

Thetford. L.C.C. propose 126 dwellings, at Thetford expanded town, Norfolk. County Architect.

Twickenham. Offices with public house, proposed by Centrovincial Estates Ltd., London. Quantity surveyors: S. Griffith and Ptnrs., 29 Greycoat St, S.W.1.

Wallingford. Extensions at Carmel College Jewish public school, to cost £300,000, proposed by the Board of Governors. Architects: Morton Lupton Ltd., 1 Church La.

Wallsend. Northumberland C.C. propose child welfare centre, Camberley Rd. C. C. Brown, County Architect, 30 Gt. North Rd, Newcastle.

MEETINGS TO NOTE

WEDNESDAY, 30 AUG.

A.S.E.E. (Portsmouth and District). "Lighting." A. D. Charters. R.A.F.A. Club, Cosham. 7.30 p.m.

FRIDAY, 1 SEPT.

Society of Instrument Technology (Fawley). "Fundamentals of Transistors and Diodes." D. Osborne. Room 4A, Admin. Bldg, Esso Petroleum, Fawley. 5.45 p.m.

A.S.E.E. (Liverpool and District). Chairman's address, J. R. Atkinson, Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

MONDAY, 4 SEPT.

Farnborough Flying Display and Exhibition at Royal Aircraft Establishment, Farnborough, until 10 Sept.

WEDNESDAY, 6 SEPT.

I.E.E. (Electronics and Communications). Conference on "Microwave Measurement Techniques," Savoy Pl, W.C.2, until 8 Sept.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

A. and W. Electrics Ltd., 6 Cockfosters Parade, Cockfosters, Herts. Nom. cap.: £100. Dirs.: James C. Arnold, Sadie C. J. Arnold and Derek Walter.

Audiolectrics Ltd., 4 Station Rd, Epping, Essex. Nom. cap.: £2,000. Dirs.: James C. Forbes and William H. Chew.

Electomec Consultants Ltd., 9-12 Cheapside, E.C.2. Industrial design consultants to the electrical, mechanical and engineering industries, etc. Nom. cap.: £5,000. Dirs.: Simon I. Nadel, Denis N. Hill and Travers E. Dore.

Electric Motor Development (Halstead) Ltd., Factory La West, Halstead, Essex. Nom. cap.: £500. Dirs.: John W. Horwood and Mrs. I. M. Horwood.

Eric Frais of Whitehall Ltd., 12 Whitehall, S.W.1. Vendors and manufacturers of electrical appliances, etc. Nom. cap.: £100. Dir.: Eric Frais.

Johns (Stoke-on-Trent) Ltd., 8 Moorland Rd, Burslem, Stoke-on-Trent. Dealers in wireless, television and electrical apparatus, etc. Nom. cap.: £2,000. Dir.: Deryck J. Swindells.

Jollys Household and Electrical Equipment Ltd., 48a Newbury La, Oldbury, Worcs. Nom. cap.: £100. Dirs.: Wm. A. Jolly and Eileen M. Jolly.

J. H. E. Litchfield Ltd., 95 West St, Warwick. To take over the business of electrician and electrical contractor carried on at Warwick by H. E. Litchfield. Nom. cap.: £2,000. Dirs.: John H. E. Litchfield and Patricia R. Litchfield.

T. Patterson Ltd., 73 Cross Green La, Leeds 9. Electrical engineers and contractors, etc. Nom. cap.: £1,000. Dirs.: to be appointed by subs. Subs.: Thomas Patterson and Mrs. Norma Patterson.

Princedale Electrical Co. Ltd., 46 Old Bond St, W.1. Nom. cap.: £1,000. Dirs.: George R. Howard and Albert J. Howard.

W. F. Rogers Ltd. To enter into an agreement with Dorothy M. V. Rogers and V. B. Mitchelmore for the acquisition of the business of radio and electrical engineers, etc. Nom. cap.: £1,000. Dirs.: Dorothy M. V. Rogers, 6 Kemerton Rd, Beckenham, and Vernon B. Mitchelmore, 104 High St. West Wickham.

Sainsbury and Parkinson Ltd., Midland Bank Chmbrs, Sutton Coldfield. Electrical, mechanical and general engineers, etc. Nom. cap.: £100. Dirs.: John Sainsbury, Allen H. Parkinson and Peter H. B. Cadman.

Solenoid Valve Co. Ltd. Manufacturers of any manually actuated or semi- and fully-automatic control equipment, etc. Nom. cap.: £100. Dirs.: not named. Subs.: A. T. Hollis and P. F. de Vic Carey, 5 Upper Belgrave St, S.W.1.

Sound Diffusion (Tapes) Ltd., Duracraft Wks, Franklin Rd, Portslade, Sussex. Manufacturers of and dealers in automatic and other telephones, wireless and television appliances, etc. Nom. cap.: £100. Dir.: Charles R. P. Stonor.

V. R. Southwell and Son Ltd., 10 Godstone Rd, Purley, Surrey. Manufacturers of and dealers in radio, electrical and mechanical apparatus, etc. Nom. cap.: £1,000. Dirs.: Victor R. Southwell, Grace D. Southwell and Rodney J. Southwell.

Tacey Electronics Ltd., 21 Llanberis Grove, Nottingham. Nom. cap.: £1,000. Dirs.: Charles L. Tacey and Mrs. Grace Tacey.

Welsh Home Warmth Plant Ltd., 1 Carnegie Drive, Lakeside, Cardiff. To take over the business of centsal heating installers, electrical equipment suppliers and installers of air conditioning equipment carried on at Cardiff, etc. Nom. cap.: £200. Dirs.: Wm. Welsh and Joan Williams.

West Herts Electrical Services Ltd., 22 Dunstable Rd, Luton, Beds. Nom. cap.: £500. Dirs.: Mrs. Barbara J. Coleman and Norman T. Coleman.

Wildman and Meguyer Ltd., The Sandpits enamel Wks, 180-190 Heely Rd, Birmingham. To acquire the goodwill and certain of the assets subject to certain of the liabilities of the business of manufacturers of enamelled iron signs and enamelled copy letters carried on by H. Green (Holdings) Ltd. (formerly Wildman and Meguyer Ltd.), at Birmingham, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Harry Green and William L. Joberns.

Wilkinson and White Ltd., 5 Walford Rd, Birmingham 11. Manufacturers, wholesalers and retailers for the electrical industry; to act as sales and service agents, etc. Nom. cap.: £100. Dirs.: Christopher L. White, Enid H. White and Frank S. Wilkinson.

Bruce Williams and Sons Ltd., 11 Peter St, Manchester 2. Electrical engineers, etc. Nom. cap.: £100. Dirs.: Bruce Williams and Barbara Williams.

Gazette Announcements

COMPANIES ACTS

Neptric Ltd. Meeting of creditors to be held at 19 Eastcheap, E.C.3, on 28 Aug., at 12 noon.

Chitnis Electronics Ltd. and **Golpalco Ltd.** Creditors to send details to liquidator: B. Manners, 7-8 Little Turnstile, W.C.1, by 31 Aug.

Martin Electric (London) Ltd. Meetings of members and creditors to be held at offices of Latham and Co., Walter Hse, 418-422 Strand, W.C.2, on 14 Sept., at 11 and 11.15 a.m., respectively.

Declo Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 9 Oct. Persons intending to appear to notify Cochrane and Cripwell, 119 Finsbury Pavement, E.C.2, by 4 p.m., 6 Oct.

The Norman Wrigley Co. Ltd. Mr G. H. Eaves, 47 Mosley St, Manchester 2, appointed liquidator at extraordinary general meeting on 31 July for the purpose of voluntarily winding-up.

Nortic Electrical Ltd. Meeting of creditors to be held at 19 Eastcheap, E.C.3, on 28 Aug.

Leonards Radio and Electrical Ltd. Petition for winding-up to be heard before the High Court of Justice, Strand, W.C.2, on 9 Oct. Persons intending to appear to notify Peacock and Goddard, 1 Raymond Bldgs, Gray's Inn, W.C.1, by 4 p.m., 6 Oct.

Carwood Electrical Supplies Ltd. Meeting of creditors and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 24 Aug., at 11.30 a.m. and 12 noon, respectively.

Partnership Dissolved

Worcester. Partnership between K. N. Harris and B. M. Hawkins, electrical suppliers, carrying on business as H. and H. Electrics at Mount View, Vicar St, Rainbow Hill, Worcester, dissolved as from 5 July.

BANKRUPTCY ACTS

Receiving Order

Coventry. R. Guise, electrical contractor, formerly carrying on business as Keresley Electrical Service, at 12 Bantam Grove, Keresley. Receiving order dated 10 Aug.

Dividend

Cardiff. K. M. Seward, radio, television and electrical dealer, carrying on business at 2-4 St. James Arcade, Newport Rd, Roath. Dividend per £: 3d payable at 106 Walter Rd, Swansea, on 26 Aug.

Public Examination

Shrewsbury. P. D. Carless and R. M. Jones, radio, television and electrical retailers, formerly carrying on business as Carless and Jones at 22 Dogpole, Shrewsbury. Public examination: 2 p.m., 19 Oct., at Shire Hall, Shrewsbury.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Dishmax. 817,692. Class 7. Dish and cutlery washing machines. Max Arc Ltd., 44-46 Terrace Rd, Walton-on-Thames.

Epitherm. 818,573. Class 17. Insulating materials, etc. A.E.G., 150 Hohenzollerndamm, Berlin-Grunewald, Germany.

Gold Star. 805,920. Class 11. Air-conditioning apparatus, etc. Elm Works Ltd., Elm Wks, Summerstown, S.W.17.

Hubbellock. B774,301. Class 9. Sockets, plugs, etc. Harvey Hubbell Inc., State St and Bostwick Ave, Bridgeport, Connecticut, U.S.A.

Kitchen Aid. B796,628. Class 7. Dish-washing machines. Hobart Mnfg. Co., 711 Pennsylvania Ave, Troy, Ohio.

Konamik. 817,989 and **Elekon.** 817,990. Class 9. Coupling and junction boxes for cables, etc. Kay and Co. (Engineers) Ltd., Bolton Brass Wks, Blackhorse St, Bolton, Lancs.

Lion. 799,255. Class 9. Batteries, etc. Lion Batteries, 4 Nelson St, Manchester 13.

Magiflow. 813,027. Class 11. Water heaters. Berry's Electric Ltd., 85-86 Newman St, W.1.

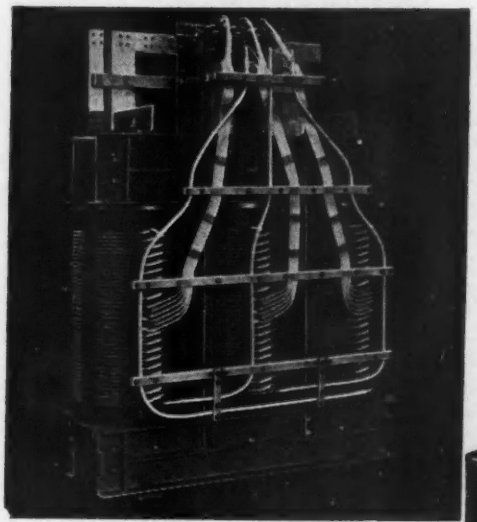
Moduflex. 810,764. Class 9. Automatic control and recording installations, etc. Hunt and Mitton Ltd., Crown Brass Wks, Oozells St North, Birmingham 1.

Unisel. B816,403. Class 9. Automatic control apparatus, etc. M.T.E. Control Gear Ltd., London Rd, Leigh-on-Sea.

Large — medium — small

TRANSFORMERS

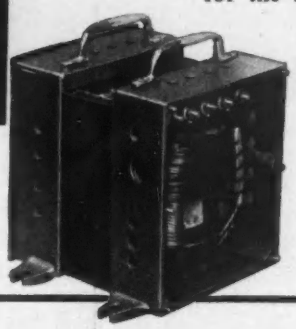
by Hackbridge



ABOVE: One of three 100 MVA 220 kV type ON transformers for Tasmania.

CENTRE: 1500 kVA distribution transformer for the Far East.

BELOW: Low power multipurpose unit.



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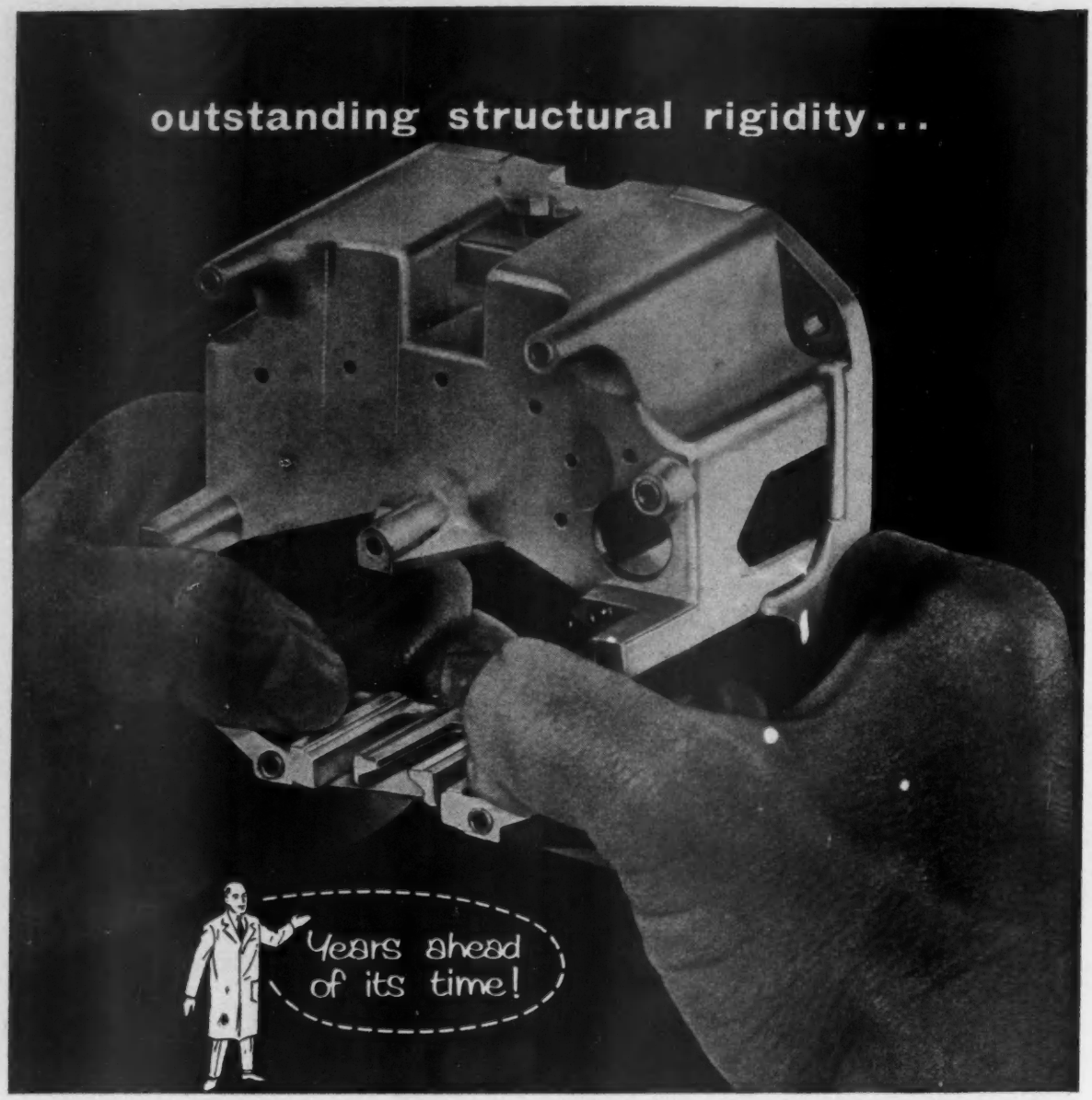

Consider this grid casting... The SANGAMO Watthour Meter embodies the very finest in materials and design. The grid casting is an outstandingly fine example of modern production technique. Made from an aluminium silicon alloy of absolute stability, it is a one-piece pressure die-casting on which no subsequent machining operations are performed. No maintenance of any sort is required. By utilising the most advanced quantity production methods in the world's most modern meter factory, it has been possible to incorporate better materials, better workmanship and better design features with the utmost economy. Thus the benefits of increased demand are passed on to the user.

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SANGAMO WESTON LTD., ENFIELD, MIDDX., ENGLAND · Tel: Enfield 3434 (6 lines) & 1242 (6 lines) · Grams: Sanwest Enfield SW/77

CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

POYNTON-WITH-WORTH PARISH COUNCIL

TENDERS are invited for the installation of Class "A" Lighting on the trunk road at Poynton, consisting of the provision and erection of 55 concrete columns and sodium lanterns. Forms of tender, specifications, and bills of quantities may be obtained from the Council Offices, where the layout plan may be seen.

Tenders to be submitted to the undersigned in plain sealed envelopes marked "Class 'A' Lighting" by noon on Monday, 18 Sept., 1961.

GEO. H. WAINWRIGHT,
Clerk of the Poynton Parish Council.
220 Park La,
Poynton, Nr. Stockport,
Cheshire. (B 672)

ELECTRICITY CORPORATION OF NIGERIA

Kaduna "B" Power Station

Contract 1033/160

TENDERS are invited for the supply and erection of two 3 MW diesel-alternators, heavy fuel treatment plant and other ancillary equipment including the engine room crane at Kaduna Power Station for the Electricity Corporation of Nigeria.

A fuller description of the extent of the Contract may be obtained from Messrs. Preece, Cardew and Rider, Consulting Engineers, 12 Queen Anne's Gate, London S.W.1, free of charge. Tenders must be complete and cover the whole of the Contract plant.

Tender documents may be otbained from Messrs. Preece, Cardew and Rider on and after 31 Aug., 1961, on payment by cheque of £15 drawn in favour of the Consultants. This payment will not be refunded.

The closing date for submission of Tenders is 9 October, 1961.

Tenders for switchgear, transformers, lighting and cables for the station will be invited at a later date. Persons interested in these should NOT now apply, but await further advertisement.

The Electricity Corporation do not bind themselves to accept the lowest or any Tender, nor will they be responsible for any costs incurred by Tenderers in making their Tender. (B 666)

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

TENDERS are invited for the maintenance of overhead lighting units at various roundabouts and traffic island installations in the administrative area of the West Riding, including periodic inspection, cleaning of lanterns, re-lamping, maintenance and setting of time switches, and the painting of columns and brackets as required.

Forms of Tender, etc., may be obtained from the County Engineer and Surveyor, County Hall, Wakefield.

The County Council do **not** bind themselves to accept the lowest or any tender.

Sealed tenders must be sent to me, the undersigned, and received at Room 87, County Hall, Wakefield, not later than 12 noon on Monday, 4 Sept., 1961.

BERNARD KENYON.
Clerk of the County Council.
(B 663)

THURROCK URBAN DISTRICT COUNCIL

Tenders for Electrical Installations

APPLICATIONS are invited from Electrical Installation Contractors who wish their names to be included on a list from which firms may be selected to submit tenders for this type of work.

Applicants must be members of either:—

(a) The National Inspection Council of Electrical Installation Contractors; or

(b) The Electrical Contractors Association.

Contractors wishing to be considered should forward their names to Mr. C. S. H. Hawkes, M.I.C.E., M.I.MUN.E., M.R.S.H., Engineer and Surveyor, Council Offices, Palmer's Ave, Grays, not later than first post, Monday, 11 Sept., 1961.

The application should be accompanied by a declaration showing to which of the above bodies they belong and a list of Authorities for whom they have executed work.

A. E. POOLE,
Clerk of the Council.
Council Offices,
Whitehall La,
Grays. (B 671)

PORTLAND URBAN DISTRICT COUNCIL

TENDERS are invited for ELECTRICAL INSTALLATION WORK at, and in, the vicinity of the Waterworks, Friar Waddon, Upwey, Weymouth, in connection with the installation of automatic pumping plant, comprising electrical wiring, underground cables, installing of h.v. transformer, capacitors, switchgear, etc. Specification may be obtained from the Water Engineer, Council Offices, Portland, and tenders endorsed "Waterworks Electrical Installation" should be forwarded to him not later than 11 Sept., 1961. (B 645)

SLEAFORD URBAN DISTRICT COUNCIL

Street Lighting Class 'A'

TENDERS are invited for the supply and erection of 17 Class "A" lighting standards and ancillary equipment. Full details, together with plans and specification, may be obtained from the Council's Surveyor at the address below on payment of a deposit of two guineas, which will be returned on receipt of a bona fide tender.

Tenders, in plain sealed envelopes endorsed "Street Lighting, A.17," should be delivered to the undersigned not later than noon on 18 Sept., 1961. The Council do not bind themselves to accept the lowest or any tender.

ERIC W. LOVATT,
Clerk of the Council.
Westgate Hse,
25 Westgate,
Sleaford, Lincs. (B 692)

APPOINTMENTS VACANT

LONDON ELECTRICITY BOARD

SENIOR DEMONSTRATOR

APPLICATIONS are invited for the above position in the Board's Northern District. The successful candidate will be based at 18-24 Lower Clapton Rd, Clapton,

continued in next column

continued from previous column

E.5, but will be required to work anywhere within the District.

Applicants should be suitably qualified, holding the E.A.W. Diploma or other approved qualification, including Electrical Housecraft, and should be experienced in conducting demonstrations in the Showroom, in public halls, in schools and at exhibitions. They should also have sales ability and be experienced in advising consumers on the selection and use of all types of domestic appliances and be capable of demonstrating all such apparatus.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 2, i.e., £700/£775 per annum, plus the appropriate London Area Allowance.

Applications, stating age, qualifications and experience, should be sent to the Manager at the above address, within 14 days of the publication date of this notice. Please quote Ref.: PER/V/3391/T. (B 676)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

South Western Region

GRADE 10 ENGINEER

MARCHWOOD GENERATING STATION

SEC/3.164

THE person appointed may be required to undertake shift operational work, control room duties, assist on maintenance work or perform general station duties. Previous experience of modern generating plant is desirable.

Applicants should have had a sound technical training and possess qualifications leading to corporate membership of an appropriate professional institution or hold equivalent qualifications.

N.J.B. Scale 10, Grade L.10, £1,190/£1,325.

Special application forms, obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by Thursday, 7 Sept., 1961.

GRADE 12 ENGINEER

MARCHWOOD GENERATING STATION

SEC/3.165

The person appointed may be required to undertake shift operational duties or perform general station duties. Previous experience of modern generating plant is desirable.

Applicants should have had a sound technical training and preferably possess qualifications leading to corporate membership of an appropriate professional institution or hold equivalent qualifications.

N.J.B. Scale 8, Grade L.12, £1,040/£1,165.

Special application forms, obtainable only from Divisional Secretary, 111 High St, Portsmouth, should be returned by Thursday, 7 Sept., 1961. (B 678)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

GENERAL ASSISTANT ENGINEER

REQUIRED at Nechells "A" and "B" Power Stations, Birmingham, for generation operation duties. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K.15, £765/£870 per annum. An allowance of £90 is payable if and when engaged on shift duties.

Applicants should have received a sound technical training and should preferably have some industrial engineering experience and have appropriate technical qualifications.

Apply, quoting Vacancy No. 215/61 MD, on form AE6, available from the Station Superintendent, Nechells Power Stations, off Aston Church Rd, Nechells, Birmingham 7, by 4 Sept., 1961. (B 654)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT ENGINEER

(CONTROL) (RELIEF)

REQUIRED at Nechells "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K14, £825/£940 per annum.

The engineer will be expected to carry out shift relief duties and when not so employed will be available to undertake duties in the maintenance and operation departments. Shift allowance as laid down in the N.J.B. Agreement will be paid when shift duties are worked. Applicants should have received a sound technical training and appropriate qualifications will be an advantage.

Apply, quoting Vacancy No. 216/61 MD, on form AE6, available from the Station Superintendent, Nechells Power Stations, Aston Church Rd, Nechells, Birmingham 7, to whom they should be returned when completed not later than 4 Sept., 1961. (B 653)

THE SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

Cardiff and East Central Area

GENERAL ASSISTANT ENGINEER,

MERTHYR AND ABERDARE DISTRICT

(To be based at Merthyr Tydfil)

Salary: N.J.B. Class G. Grade 11, Scale 5, £825/£940 per annum.

Applications stating age, present position, present salary, qualifications and experience should be addressed to C. L. Townsend, ASSOC.I.E.E., Manager, Cardiff and East Central Area, Colchester Ave, Cardiff, to arrive not later than 9 Sept., 1961.

Please quote Ref. 100/61/ET endorsing envelope "General Assistant Engineer, Merthyr."

Monmouthshire and Mid-Wales Area

ASSISTANT ENGINEER

MID-WALES AND

NORTH MONMOUTHSHIRE DISTRICT

(To be based at Brecon)

Salary: N.J.B. Class E, Grade 7, Scale 7, £965/£1,090 per annum.

Applications stating age, present position, present salary, qualifications and experience should be addressed to W. E. Richardson, M.I.E.E., Manager, Monmouthshire and Mid-Wales Area, Llywelyn Rd, Cwmbran, to arrive not later than 9 Sept., 1961.

Please quote Ref. 99/61/ET endorsing envelope "Assistant Engineer, Brecon."

R. G. WILLIAMS,
Secretary,
(B 670)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

APPLICATIONS are invited for the position of

ASSISTANT ENGINEER (EFFICIENCY)

at Hams Hall "A," "B" and "C" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Class N, Grade 8, £1,535/£1,720 per annum.

The successful applicant will be responsible to the Efficiency Engineer for the testing of boiler and turbine plant, routine testing of auxiliary plant, and the analysis of statistical returns and station performance. Candidates should have received a thorough practical and theoretical training in a modern power station and should preferably be corporate members of a recognised professional institution or hold qualifications leading to such membership.

Apply, quoting Vacancy No. 214/61 MD, on form AE6, available from the Station Superintendent, Hams Hall Power Stations, Lea Marston, Sutton Coldfield, Warwickshire, by 4 Sept., 1961. (B 655)

GOVERNMENT OF NORTHERN RHODESIA

Ministry of African Education

TECHNICAL MASTER

(ELECTRICAL INSTRUCTOR)

REQUIRED: either (a) with prospects of admission to permanent and pensionable establishment or (b) on temporary terms for one tour in first instance with generous gratuity. Initial tours are for three years. Commencing salary according to age and experience in scale rising to £1,720 a year. Free passages. Liberal leave on full salary.

Candidates, between 24 and 35 years of age, must possess C. and G. Final Certificate in electrical installation work or equivalent. Successful candidate will be required to teach African students up to C. and G. Final Certificate standard.

Apply to CROWN AGENTS, 4 Millbank, London S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience and quoting reference M2A/51334/D10. (B 641)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Project Group

THIRD ASSISTANT ENGINEER

(SITE PROGRESS)

APPLICATIONS are invited for the appointment of Third Assistant Engineer (Site Progress) at Aberthaw Power Station.

Candidates should preferably possess a Higher National Certificate in either mechanical or electrical engineering and have served a recognised engineering apprenticeship. Experience on the construction of heavy plant as installed in modern power stations either in a manufacturers works or on site is essential and a knowledge of the civil engineering work involved would be an advantage.

The selected candidate will be required to maintain up-to-date charts on the progress of the works on site in accordance with previously agreed programmes and to assist the Resident Engineer in anticipating any divergence from these programmes. Ability to co-ordinate with Regional P.I.T. Officers will be required.

The salary will be within Grade 7, Scale 13, £1,320/£1,610 per annum of the National Joint Board Agreement.

Applications should be made on standard form AE6, available from the Administrative Officer, Midlands Project Group, P.O. Box 314, Birmingham 30, and should be returned to him not later than 11 Sept., 1961.

Envelopes should be marked "Confidential —Staff Vacancy No. MPG.55/61." (B 644)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

Yorkshire Division

POWER STATION SUPERINTENDENT

THORPE MARSH POWER STATION

APPLICATIONS are invited for the appointment of Power Station Superintendent at the new Thorpe Marsh Power Station near Doncaster, designed for an ultimate capacity of 1,100 MW, comprising 2/550 MW units.

The first 550 MW unit will be commissioned in April, 1963, and the second in Aug., 1964.

Salary: £3,040/£3,270 per annum, Class F, Grade 6 of the National Joint Managerial and Higher Executive Grades salary scales.

Candidates should have had wide experience in the management of a large modern power station and possess good engineering qualifications.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 15 Sept., 1961. (B 661)

THE NORTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER

(POWER SALES)

SUB-AREA COMERCIAL DEPARTMENT

MANCHESTER

APPLICANTS should be qualified to advise consumers on the application of electricity to industrial processes, especially in the Engineering, Chemical and Textile Industries. Some knowledge of space and process heating is desirable.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary Scale: £1,275/£1,410 p.a., Grade M10. N.J.B. conditions.

Applications on forms to be obtained from the Manager (Staff Vacancy), No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester 2, P.O. Box 493, and returned to him by 4 Sept., 1961.

SECOND ASSISTANT ENGINEER

SUB-AREA ENGINEERING DEPARTMENT

BLACKBURN

Applicants must have had experience in the planning, design and construction of all types of overhead and underground systems and substations.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary Scale: £1,535/£1,720 p.a. Grade L6. N.J.B. conditions.

Applications on forms to be obtained from the Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, and returned to him by 4 Sept., 1961. (B 652)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

North Thames Division

APPLICATIONS are invited for the following appointment:

FIRST ASSISTANT STATION CHEMIST

WEST THURROCK GENERATING STATION

(GRAYS, ESSEX)

Salary: N.J.B. Class M, Grade 8, Scale 13, £1,440/£1,610 per annum plus London Weighting £60 p.a.

Applicants should have wide experience in providing the chemical services at a modern generating station, including control of water treatment plant, chemical testing of plant, and the supervision of laboratory methods.

Some knowledge of the chemical and metallurgical problems of commissioning and operating high pressure plant, is also required.

Applicants should possess recognised qualifications in chemistry, at least of Higher National Certificate level.

Applications, quoting Reference No. S.V. 1536, stating age, qualifications, experience and present position should be sent to the Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 2 Sept., 1961.

F. W. SKELCHER,
Assistant Regional Director.
(B 662)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT SECTION ENGINEER

REQUIRED in the Runcorn District of the Board's No. 2 Sub-Area. Salary within range £965/£1,090 per annum (N.J.B. G/9).

Applicants should have received an engineering training and have experience in h.v. and m.v. overhead and underground distribution work. Technical qualification desirable.

Appointment subject to medical examination. Pension scheme.

Standard application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway Hse, Northwich, Cheshire.

Closing date: 8 Sept., 1961. (B 667)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

East Midlands Division

GENERAL ASSISTANT ENGINEER

(MECHANICAL MAINTENANCE)

DRAKELOW "A" AND "B" POWER STATIONS

Vacancy No. 189/61.

APPLICATIONS are invited for the position of General Assistant Engineer (Mechanical Maintenance) at Drakelow "A" and "B" Power Stations, near Burton-on-Trent.

Preference will be given to candidates who hold the Higher National Certificate or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

Salary will be in accordance with Class M, Grade 16 (£825/£940 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 1 Sept., 1961.

ASSISTANT PLANNING ENGINEER

WILLINGTON "A" AND "B" POWER STATIONS

Vacancy No. 190/61.

Applications are invited for the position of Assistant Planning Engineer at Willington "A" and "B" Power Stations, P.O. Box No. 27, Derby.

Applicants should have held a position of responsibility in a modern power station and should have received a thorough practical and theoretical training.

Preference will be given to candidates who are corporate members of a recognised professional institution or who hold qualifications leading to such membership.

Salary will be in accordance with Class M, Grade 8 (£1,440/£1,610 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 1 Sept., 1961.

ASSISTANT EFFICIENCY ENGINEER

DRAKELOW "A" AND "B" POWER STATIONS

Vacancy No. 191/61.

Applications are invited for the position of Assistant Efficiency Engineer at Drakelow "A" and "B" Power Stations. near Burton-on-Trent.

Applicants should have held a position of responsibility in a modern power station and should have received a thorough practical and theoretical training.

Preference will be given to candidates who are corporate members of a recognised professional institution or who hold qualifications leading to such membership.

Salary will be in accordance with Class M, Grade 8 (£1,440/£1,610 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 1 Sept., 1961.

SHIFT CHARGE ENGINEER

WARWICK POWER STATION

Vacancy No. 192/61.

Applications are invited from qualified engineers for the position of Shift Charge Engineer at Warwick Power Station, Emscote Rd, Warwick.

Applicants should have had experience in the operation of steam turbine and boiler plant.

Salary will be in acordance with Class E, Grade 7 (£965/£1,090 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 1 Sept., 1961.

GENERAL ASSISTANT ENGINEER

(ELECTRICAL MAINTENANCE)

WILLINGTON "A" AND "B" POWER STATIONS

Vacancy No. 194/61.

Applications are invited from suitably qualified engineers for the position of

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General Assistant Engineer in the Electrical Maintenance Department at Willington "A" and "B" Power Stations, P.O. Box No. 27, Derby, which is one of the largest power station groups in Europe. The successful applicant will receive training in all aspects of electrical maintenance and be expected to play a full part in the routine work of the Department.

The salary will be within Class M, Grade 16 (£825/£940 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 1 Sept., 1961.

SECOND ASSISTANT STATION CHEMIST

CASTLE DONINGTON POWER STATION

Vacancy No. 199/61.

Applications are invited for the position of Second Assistant Station Chemist at Castle Donington Power Station, near Derby.

Applicants should possess the Higher National Certificate in Chemistry and be experienced in the analysis and testing of fuels, water and oil, and in the interpretation of the results as applied to high pressure power station plant.

Salary will be in accordance with Class L, Grade 11 (£1,115/£1,245 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 8 Sept., 1961.

STATION SHIFT CONTROL ENGINEER

LINCOLN POWER STATION

Vacancy No. 200/61.

Applications are invited for the position of Station Shift Control Engineer at Lincoln Power Station, Spa Rd, Lincoln.

Applicants should have had a sound training and practical experience in a modern power station. The possession of a Higher National Certificate in Electrical Engineering, or its equivalent, would be advantageous.

Salary will be in accordance with Class F, Grade 10 £825/£940 per annum), plus shift enhancement.

Closing date for receipt of applications: 8 Sept., 1961.

These appointments are pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

FOURTH ASSISTANT ENGINEERS (TESTING)

DIVISIONAL HEADQUARTERS

NOTTINGHAM

Vacancy No. 193/61.

Applications are invited for the positions of Fourth Assistant Engineers (Testing) at Divisional Headquarters, Nottingham.

Applicants should have received a thorough engineering and technical training and preferably experience in operating and testing modern high performance steam generating plant, or in the field of non-destructive testing of materials.

The salary will be in accordance with Class L, Grade 11 (£920/£1,245 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 1 Sept., 1961.

This appointment will be pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Administrative Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box No. 25, Barker Gate, Nottingham, and returned to him by the date stated.

O. S. WOODS,
Assistant Regional Director.
(B 679)

LONDON ELECTRICITY BOARD

ASSISTANT DISTRIBUTION ENGINEER AND GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the under-noted positions in the Board's Essex Suburban District at 497/9, Ley St, Ilford, Essex.

Arising from special circumstances, rented housing accommodatiton will be available for one of the successful candidates.

ASSISTANT DISTRIBUTION ENGINEER

(Ref.: PER/V/3389/T)

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class H, Grade 11, £940 per annum rising to £1,065 per annum, inclusive of London Allowance.

GENERAL ASSISTANT ENGINEER

(Ref.: PER/V/3390/T)

Applicants should have a sound technical education to the standard of the Higher National Certificate, and have completed a recognised period of training in the electricity industry, or have equivalent experience.

The post is graded under Schedule A of the National Joint Board Agreement, Class K (Area), as Grade 15, £725/£920 per annum, inclusive of London Allowance.

Applications, stating age, qualifications and experience and quoting the appropriate ref. number, should be sent to the Manager at the above address, within 14 days of the publication of this notice. (B 656)

MIDLANDS ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT ENGINEER

REQUIRED in the South West District of the Birmingham Area.

Extensive experience necessary with high voltage, medium voltage and protective systems. Applicants should have technical qualifications commensurate with eligibility of Corporate Membership of the I.E.E.

Salary: £1,650/£1,830 per annum (N.J.B. Grade K4). Superannuable.

Apply, by letter, within 14 days, stating age, experience, qualifications, present position and salary to Emil Braathen, Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

F. W. CATER,
Secretary.
(B 668)

THE EAST MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified and experienced persons for the following appointment. Applicants should state age, qualifications, experience, etc., and quote the vacancy number.

Lincolnshire Sub-Area

THIRD ASSISTANT DISTRICT ENGINEER

BOSTON DISTRICT

Vacancy No. 104/61.

Salary: N.J.B. Class F, Grade 9, £890/£1,015 per annum.

The duties will include assisting in the operation, maintenance, planning and construction of rural and urban networks up to and including 11 kV.

The person appointed will be required to live in or near Boston, and to undertake standby duty.

Applications should be forwarded to the Manager, Lincolnshire Sub-Area, North Hse, Grantham, Lincs, by 15 Sept., 1961. (B 673)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT ENGINEERS (RELIEF)

REQUIRED at Stourport "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K10, £1,115/£1,245 per annum.

The successful applicants will be trained to act as reliefs for the Assistant Shift Charge Engineers. For periods when undertaking the full duties of these positions they will be paid the appropriate grade and shift allowance.

A sound technical training and practical power station experience are required, and a knowledge of unit plant with p.f. boilers, operating at high pressure and high temperature will be an advantage. Appropriate technical qualifications desirable.

Apply, quoting Vacancy No. 222/61 MD on form AE6, which is available from the Station Superintendent, Stourport Power Station, Severn Side, Stourport, Worcs., to whom they should be returned to arrive not later than 4 Sept., 1961. (B 682)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Vacancy No. 251/ET/61.

APPLICATIONS are invited for the superannuable N.J.B. appointment of

ASSISTANT ENGINEER (CO-ORDINATING)

at Uskmouth "B" Power Station, West Nash, Nr. Newport, Mon.

Salary: Schedule A, Class K, Grade 10, Scale 9, £1,115/£1,245 per annum.

Applicants should possess a Higher National Certificate in either mechanical or electrical engineering, and should be capable of organising job training for power station employees. Previous experience or training in the electricity supply industry desirable.

The successful candidate will conduct special investigations, organise civil defence and fire fighting services, and carry out other general duties as required by the station superintendent.

Special application forms obtainable from Divisional Secretary, Central Electricity Generating Board, South Wales Division, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 9 Sept., 1961. (B 684)

BRANCH MANAGER
(Overseas)

Large Electrical Installation Contractors require experienced Manager for their branch in West Africa.

Applicants should be between the ages of 30-45 and have recent experience of controlling a branch with turnover of approximately £¼ million.

Excellent conditions and prospects are offered.

Applications in writing in first instance, giving details of past experience to:—

Box No. 8395, Electrical Times.
(B 650)

TRANSFORMERS
(WATFORD) LIMITED

require, due to expansion

SENIOR and JUNIOR
DRAUGHTSMEN

experienced on Power and Distribution transformers. Good salary, plus production bonus. Non-contributory pensions scheme. Excellent working conditions.

Apply, with full particulars:—

Chief Draughtsman, Transformers (Watford) Ltd., Sandown Rd, Watford, Herts.
(B 647)

YORKSHIRE ELECTRICITY BOARD

Head Office

CHIEF ENGINEER'S DEPARTMENT

SECOND ASSISTANT ENGINEER

DISTRIBUTION DESIGN (SUBSTATIONS)

DUTIES will include the design of indoor and outdoor substations operating at voltages of 33 kV and above, the preparation of specifications for substation plant and subsequent negotiations with plant manufacturers. They will also cover protective gear applications on the primary h.v. system.

Applicants should have a sound general knowledge of substation plant and some experience of field construction.

Salary: N.J.B. Class K, Grade 5, within the range £1,415/£1,720 per annum, the commencing salary being dependent upon qualifications and experience.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than 8 Sept., 1961.

No. 4 (Leeds) Sub-Area

SECOND ASSISTANT ENGINEER

(CONSTRUCTION)

Applications are invited for the position of Second Assistant Engineer (Construction).

The successful applicant will be required to take charge of the Sub-Area Drawing Office, supervising Electrical Building and Cartographic Draughtsmen, and maintaining liaison with the District Drawing Offices on Drawing Office practice and policy.

Applicants should have a good knowledge of modern drawing office practice and organisation; the ability to design and prepare specifications for all types of building will be an advantage.

Salary: N.J.B. Class L, Grade 7 (Scale 13), £1,440/£1,610 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Leeds, not later than 8 Sept., 1961.

No. 1 (Bradford) Sub-Area

THIRD ASSISTANT ENGINEER

(CONSTRUCTION)

Applicants should be experienced in the Construction and Commissioning of large substations and complete overhead and underground H.V. systems, preferably including those operating at 33 kV.

Salary: N.J.B. Class L, Grade 10, (Scale 10), £1,190/£1,325 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford 1, not later than 8 Sept., 1961.

No. 2 (Huddersfield) Sub-Area

FOURTH ASSISTANT ENGINEER

(DRAUGHTSMAN)

Applicants should have a sound knowledge of drawing office practice, experience in the preparation of drawings for substations, offices, and building alterations.

Salary: N.J.B. Class L, Grade 12 (Scale 8), £1,040/£1,165 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market St, Huddersfield, not later than 8 Sept., 1961.

No. 5 (Wakefield) Sub-Area

WAKEFIELD DISTRICT

FOURTH ASSISTANT DISTRICT ENGINEER

Applicants should have had experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution systems. The post will be based in the Dewsbury Engineering Unit.

Applicants must be prepared to reside in the district and undertake standby duties.

Salary: N.J.B. Class H, Grade 11 (Scale 6), £890/£1,015 per annum.

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Applications, together with the names of two referees, should be sent to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 8 Sept., 1961. (B 675)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT ENGINEER (WORKS SUPPLY)

REQUIRED at Hams Hall "B" Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K12, £965/£1,090 per annum, plus 10% shift allowance.

Applicants should have received a sound technical training and should preferably have had experience in the control of the works supply system. Appropriate technical qualifications will be an advantage.

Apply, quoting Vacancy No. 219/61 MD on form AE6, available from the Station Superintendent, Hams Hall Power Stations, Lea Marston, Sutton Coldfield, Warwicks, by 4 Sept., 1961. (B 681)

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

South Western Region

ASSISTANT ENGINEER (INSTRUMENTS)

MARCHWOOD GENERATING STATION

SEC/3.166.

CANDIDATES should have previous experience of modern generating station plant and a sound knowledge of instruments and other measuring apparatus used in generating stations.

Applicants should have had a sound technical training and should possess qualifications leading to corporate membership of an appropriate professional institution, or hold equivalent qualifications.

Salary: N.J.B. Scale 12, Grade L.8, £1,350/£1,500.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 7 Sept., 1961. (B687)

CROMPTON PARKINSON
(CHELMSFORD) LTD.

require a

CHIEF OF ROTATING MACHINE TEST

The Company manufactures Industrial a.c. Motors/Generators up to 4,000 h.p./kVA; Industrial d.c. Motors/Generators up to 1,500 h.p./kW; and Traction d.c. Motors/Generators up to the largest sizes. The applicant is to be responsible for the testing of the whole of this equipment. Apply in confidence, giving particulars of age, experience and qualifications to Personnel Officer, Crompton Parkinson (Chelmsford) Ltd., Writtle Rd, Chelmsford.
(B 591)

QUANTITY SURVEYORS
(Electrical)

Experienced Quantity Surveyors required by Electrical Contractors for measuring large electrical contracts throughout the U.K.

Applications will be considered from persons who have a sound back-ground of quantity surveying, but without previous electrical experience.

Apply in first instance giving fullest details of personal history and experience to:—

Box No. 8393, Electrical Times.
(B 649)

CONSTRUCTORS JOHN BROWN LIMITED

have several vacancies for

SUPERVISING ELECTRICAL ENGINEERS

Applicants should have served a recognised full apprenticeship with a reputable electrical contractor, be educated to a reasonable technical standard and have experience of large industrial and flameproof installations from estimating to final account stage.

The successful candidates would be required to reside on sites in the U.K. and abroad for periods of from one to two years. Good salaries and allowances.

Please apply in writing, giving details of age, experience and qualifications, to:

Personnel Manager,
CONSTRUCTORS JOHN BROWN LIMITED,
C.J.B. Hse, Eastbourne Terrace, Paddington, London W.2.

(B 575)

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

CLERK OF WORKS (ENGINEERING)

REQUIRED to assist Senior Clerk of Works in supervision of engineering works at Welwyn/Hatfield new hospital now under construction. This is a new appointment expected to last for at least two years.

Applicants must have served an apprenticeship in mechanical or electrical engineering and have had not less than five years' experience supervising site installations. They must be capable of supervising both mechanical and electrical work.

Salary within scale £800/£1,050.

Apply, stating age, qualifications and experience, with names of two referees (preferably employers) to Secretary, North West Metropolitan Regional Hospital Board, 40 Eastbourne Ter, W.2, by 11 Sept., quoting Reference 972. (B 674)

CHIEF TEST AND INSPECTION ENGINEER

Gresham Transformers Limited, Twickenham Rd, Hanworth, Middlesex, have a vacancy for a Chief Test and Inspection Engineer.

The successful applicant will be responsible to the Chief Engineer for all testing and inspection of power transformers up to 5 MVA, and an extensive range of special equipments, including transductors, welding transformers, static rectifier sets, and voltage regulators. The testing work includes type tests such as impulse and noise tests, and all experimental and development testing.

The position demands an education level up to Higher National Certificate, with experience of transformer manufacture and testing, also the ability to supervise and train personnel, and to deal with customers at the inspection and testing stage.

Applicants should write, giving full particulars, to the Chief Engineer, at the above address. (B 660)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule B. Salary includes London Allowance.

FOURTH ASSISTANT ENGINEER
ELECTRICAL DEPARTMENT,
TECHNICAL SECTION
(COMMISSIONING AND PROTECTION)
GENERATION HOUSE
Vacancy No. 61/496

Applications are invited from engineers having a sound technical training with qualifications leading to Corporate Membership of the I.E.E. Some knowledge of the design and testing of protective equipment would be an advantage. Experience in the manufacture and/or testing of electrical equipment used in the Supply Industry is desirable. Salary: Grade 11, £950/£1,215 per annum.

Applications, quoting Vacancy No., may be made (on the standard form obtainable locally) and sent to the Personnel Department, Central Electricity Generating Board, P.O. Box No. 136, London W.1, not later than 5 Sept., 1961. (B 657)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

GENERAL ASSISTANT ENGINEERS

REQUIRED at Stourport "A" and "B" Power Stations for generation operation duties. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K15, £765/£870 per annum. An additional 10% of basic salary (minimum £90) is payable if and when engaged on shift duties.

The appointment is permanent with excellent opportunities for advancement. It is necessary that applicants should have received a sound technical training and should preferably have had some industrial engineering experience and have as a minimum qualification the Ordinary National Certificate.

Apply, quoting Vacancy No. 221/61 MD on form AE6, available from Station Superintendent, Stourport Power Station, Severn Side, Stourport-on-Severn, Worcs., not later than 4 Sept., 1961. (B 683)

ESTIMATING ENGINEERS
(Electrical)

Several Senior and Junior Estimating Engineers with at least five years' experence of tendering for large Electrical Contracts, required by Electrical Contractors with interests in the U.K. and many overseas countries.

Opportunities for advancement together with excellent conditions and salary available. Some assistance with housing may be available.

Applications in writing in first instance, giving details of past experience to:—
Box No. 8397, Electrical Times.
(B 651)

BRITISH JEFFREY-DIAMOND LTD.,
require the services of an experienced

A.C. MOTOR DESIGNER

able to undertake the electrical and mechanical design of the range of mining motors manufactured by the Company. This involves standard S.C. motors and special purpose motors where original development is necessary. The successful applicant will join a well established but quickly expanding company.

Replies to be addressed to the Secretary, British Jeffrey-Diamond Ltd., Stennard Wks, Wakefield. (B646)

SOUTH WALES SWITCHGEAR LTD.

require a

SENIOR SALES REPRESENTATIVE

to cover the Area of the Eastern Electricity Board. The successful applicant should be experienced in the switchgear and transformer industry. This appointment offers excellent opportunities for promotion in a progressive Company. Please reply to the General Manager, South Wales Switchgear Ltd., Blackwood, Monmouthshire. (B 638)

SOUTH WESTERN ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT ENGINEER
(PLANNING AND CONSTRUCTION)
WEST CORNWALL

SALARY within Class G, Grade 5, Salary Scale 11, £1,275/£1,410 per annum of the N.J.B. Agreement.

The person appointed will be responsible to the District Engineer for all aspects of planning, including preparation of schemes and estimates for the extension and reinforcement of the distribution systems, both overhead and underground up to and including 11 kV. He will also be responsible for preparing the District construction programme and for overall supervision of construction gangs.

Candidates should have a wide experience of planning, construction and operation of urban and rural distribution systems, and a knowledge of budget preparation and long-term forecasting. Qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers are most desirable, and the possession of a current driving licence will be an advantage.

Applications for this post to be made on Standard Form AE6/ACT OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, 13 Basset Rd, Camborne. Closing date for receipt of completed applications is 9 Sept., 1961. (B 677)

BICC

SALES ENGINEER

(age range 25-35)

required for

PANELEC HEATING DIVISION

Applications are invited from qualified heating or electrical engineers. Experience of electric floor-warming and electric heating applications an advantage. The selected candidate will be based in

LONDON

Excellent prospects with good conditions of service, including pension scheme, car, etc.

Apply with full details of experience to:—

Personnel Officer,
(Home Sales Regions and Branches),
British Insulated Callender's Cables Ltd.,
21 Bloomsbury St,
London W.C.1.
(B 691)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

North Caledonia Area

APPLICATIONS are invited for the superannuated post of

FOURTH ASSISTANT ENGINEER
(CONSTRUCTION)

based on Area Office, Elgin. Experience in the construction and maintenance of overhead lines and/or substations is desirable. Technical qualifications an advantage.

Salary and Conditions in accordance with the N.J.B. Schedule, Class H, Grade 13 (Scale 4) £765/£870.

Application form, obtainable from the Area Manager, West Villa, South St, Elgin, should be returned by 13 Sept., 1961, quoting Vacancy No. 61/17. (B 689)

CAMEROONS DEVELOPMENT CORPORATION

REQUIRE an

ELECTRICAL SUPERVISOR

who should be over 30 years of age and must have served a recognised apprenticeship and possess the Ordinary National Certificate in Electrical Engineering. The selected candidate will be in charge of workshops undertaking the repair and maintenance of industrial and domestic electrical equipment, and will be responsible for maintenance and installation work over a large area. Practical experience of industrial and domestic installations, H.T. and L.T. distribution is required. A knowledge of C.B. and PAX telephone systems and refrigeration desirable.

Minimum commencing salary £1,100 p.a., plus participation in the bonus scheme. Free return passages. Free furnished accommodation and a reasonable amount of free light and fuel. Free medical attention in the territory. Outfit allowance of £80. Children's allowances are payable up to a maximum of two, at the rate of £75 each p.a. Provident fund. Tours of 18-24 months with liberal leave on full pay on completion of tour.

Applicants should send full particulars to the Personnel Officer, Colonial Development Corporation, 33 Hill St, London W.1, quoting Serial 611. (B 685)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Dundee Area

THIRD ASSISTANT ENGINEER
(COMMUNICATIONS)

APPLICANTS should have obtained a Higher National Certificate or equivalent qualification and have had some training/experience in Communications Systems.

Duties will include assisting in the Supervisory Control, Radio Telephony and Communications Systems in the area.

Salary: N.J.B. Class J, Grade 11, £965/£1,090 per annum.

Applications should be made on application forms obtainable from the Area Manager, North of Scotland Hydro-Electric Board, 7 Dudhope Cres Rd, Dundee. (B 640)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

NORTHFLEET POWER STATION

Vacancy No. 149A/61

ASSISTANT ENGINEER (OPERATION)

CANDIDATES must be prepared to do relief and shift work when required. Experience with modern generating plant would be an advantage.

Salary: N.J.B. Class M, Grade 12, £1,165/£1,295 per annum, including London allowance, plus 10% shift allowance when applicable.

Applications giving age, details of experience, qualifications, etc. should be sent to the Station Superintendent, Northfleet Power Station, Crete Hall Rd, Northfleet, Kent, to arrive by 6 Sept. (B 669)

BRITISH GUIANA ELECTRICITY CORPORATION

APPLICATIONS are invited for appointment as

MAINTENANCE ENGINEER

at the Corporation's Kingston "A" and "B" Power Stations in Georgetown and other generating plant.

The "A" station comprises wood- and oil-fired boilers with five turbo-alternators aggregating 12·25 MW, and the "B" station two 10 MW turbo-alternator sets and oil-fired boilers which are scheduled for commissioning at the end of 1962.

Applicants, over 30 years of age, should preferably have served a mechanical engineering apprenticeship and hold the Higher National Certificate in mechanical engineering or equivalent, and have had considerable practical experience in the maintenance of power station mechanical plant, training staff, and of the organisation and records of a maintenance department.

Salary will start at £1,500 per annum with annual increments of £75. Free passages will be provided for successful applicant and family.

Employment will be on contract for three-year periods each followed by three months' vacation on pay. Local leave will be granted about mid-tour with free passages to neighbouring islands is desired.

Housing will be subsidised, cheap rate electricity, free telephone and transport provided for performance of duty. Medical benefits and initial outfit allowance granted. Low income tax.

Full terms of employment will be advised to suitable applicants.

Applications endorsed "Maintenance Engineer British Guiana," accompanied by full personal particulars, including age, education, qualifications, experience, and past employment, should be made in writing within 14 days of the date of this advertisement to:

PREECE,CARDEW & RIDER,
8-12 QUEEN ANNE'S GATE,
WESTMINSTER, S.W.1.
(B 642)

SOUTHERN ELECTRICITY BOARD

PLANNING ENGINEER

HESTON District of No. 1 (Southall) Sub-Area. Salary: N.J.B. Class H, Grade 7 (£1,190/£1,325 per annum, plus £50 per annum London allowance). N.J.B. Conditions of Service.

The duties of the post will include the preparation of schemes and estimates for extensions and/or reinforcements to overhead and underground networks up to and including 11 kV. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middlesex, and returned to him, quoting Z.1393, not later than 4 Sept., 1961.

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Yeovil District of No. 4 (Bournemouth) Sub-Area. Salary: N.J.B. Class G, Grade 9 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The successful candidate will be required to assist in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should have had sound experience in electricity supply distribution and the possession of suitable technical qualifications would be an advantage. The successful candidate will be required to carry out standby duties if and when called upon to do so.

continued in next column

continued from previous column

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him quoting Z.1392, not later than 4 Sept., 1961.

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Melksham District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class G, Grade 9 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist with the review of H.V. and L.V. system loading conditions for operating and planning purposes, with the maintenance of mains and substations, and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him quoting Z.1374, not later than 4 Sept., 1961.

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Heston District of No. 1 (Southall) Sub-Area. Salary: NJ.B. Class H, Grade 11 (£940/£1,065 per annum, inclusive of London allowance). N.J.B. Conditions of Service.

Applicants should have had experience in the preparation of specifications and estimates for all types of electrical installations. They should be competent to supervise electricians and organise the allocation of work.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middlesex, and returned to him quoting Z.1365, not later than 4 Sept., 1961.

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Melksham District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class G, Grade 10 (£890/£1,015 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist the Planning Engineer in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him quoting Z.1375, not later than 4 Sept., 1961.

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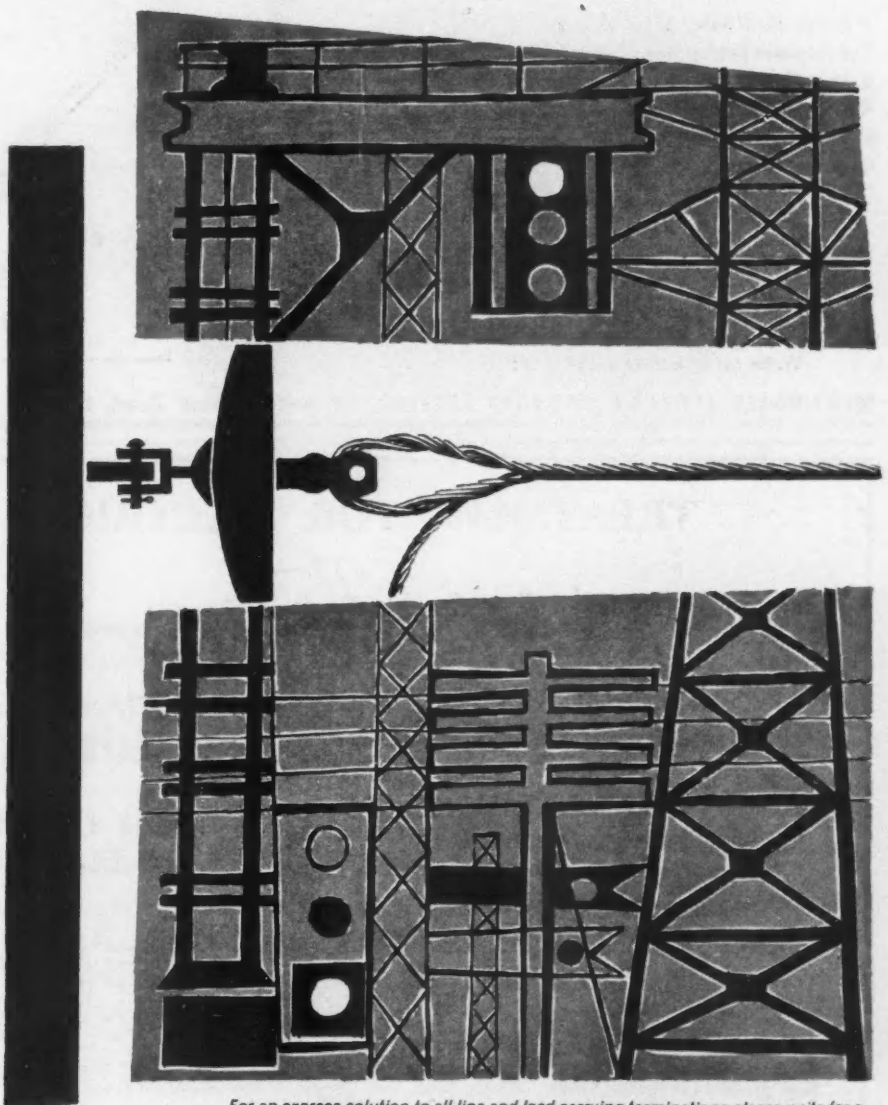

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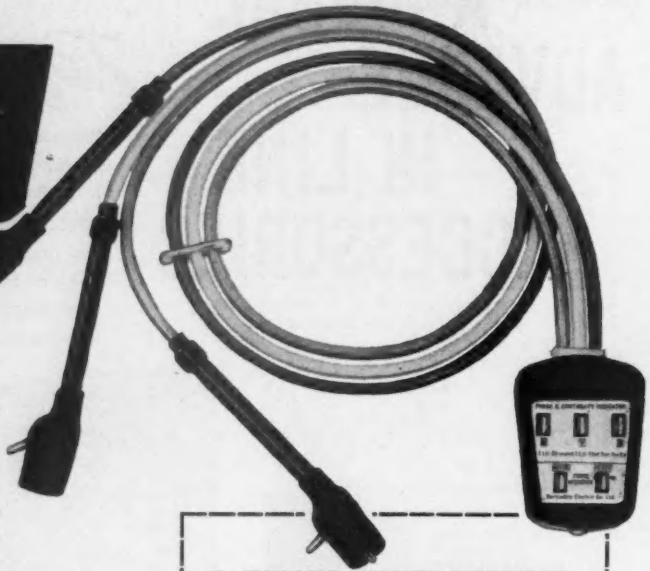

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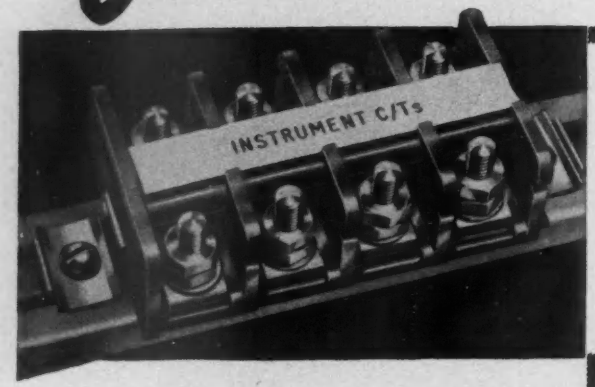

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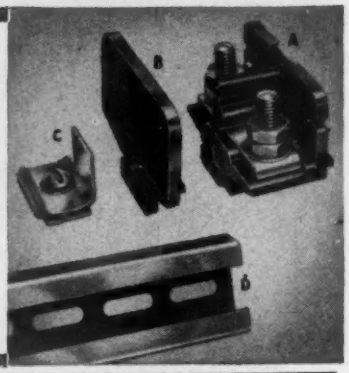

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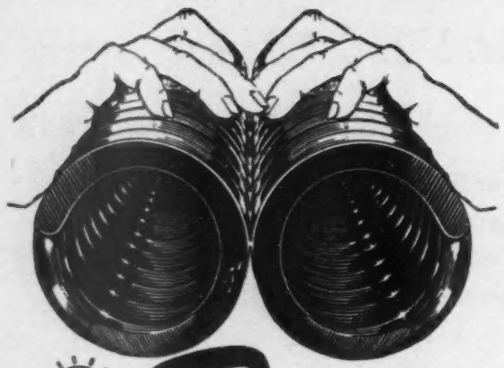

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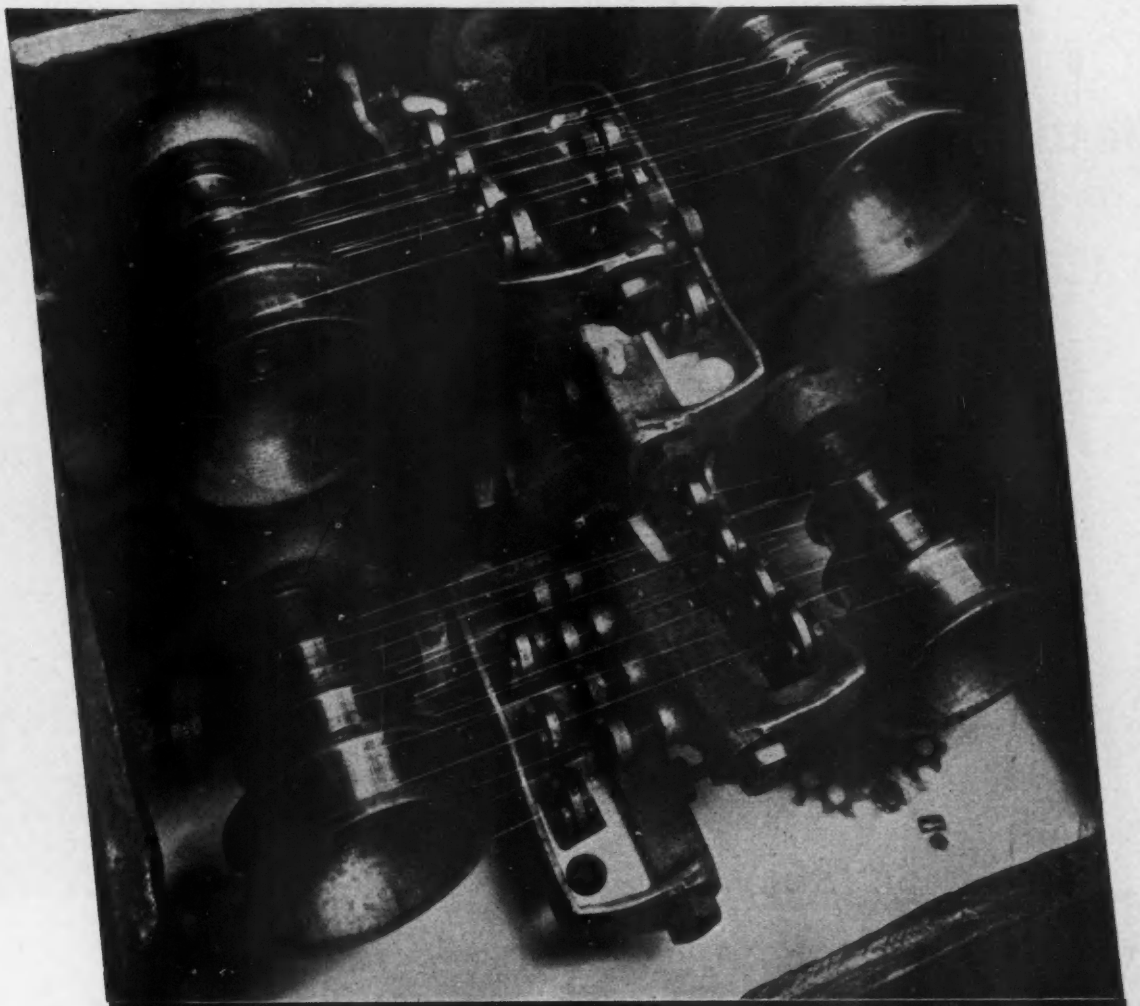

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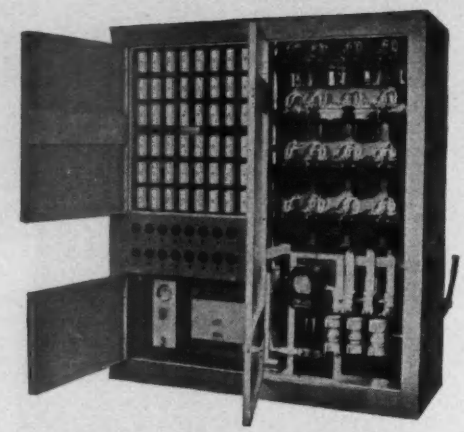

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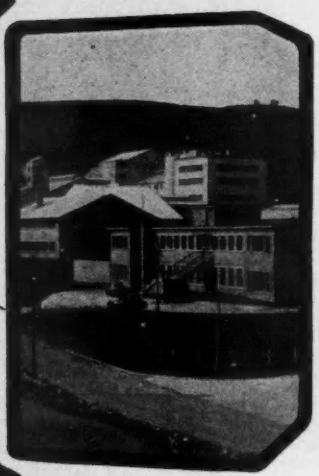

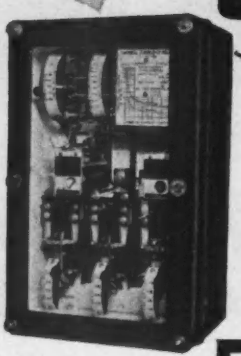

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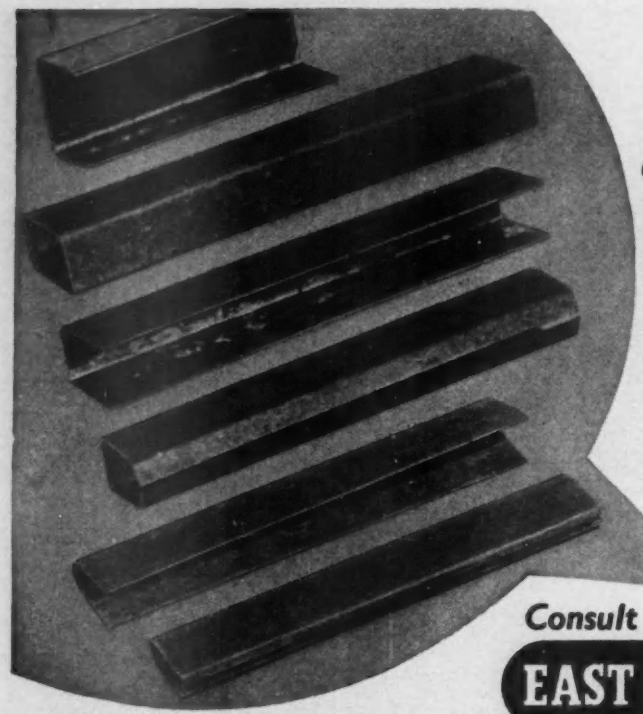

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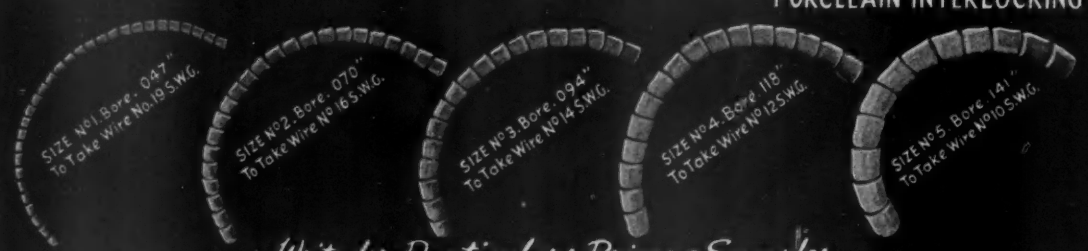
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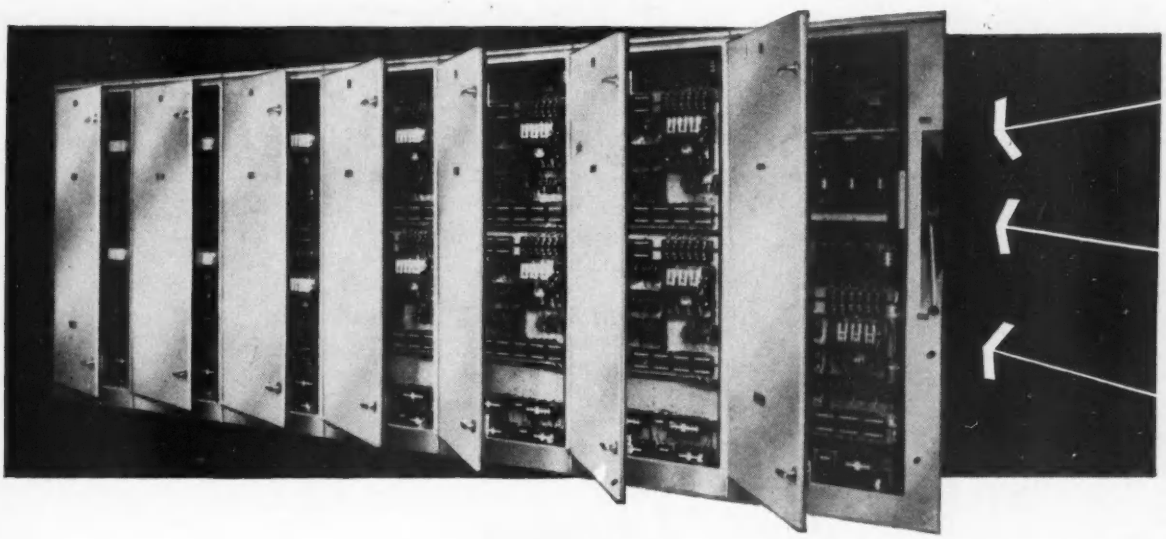

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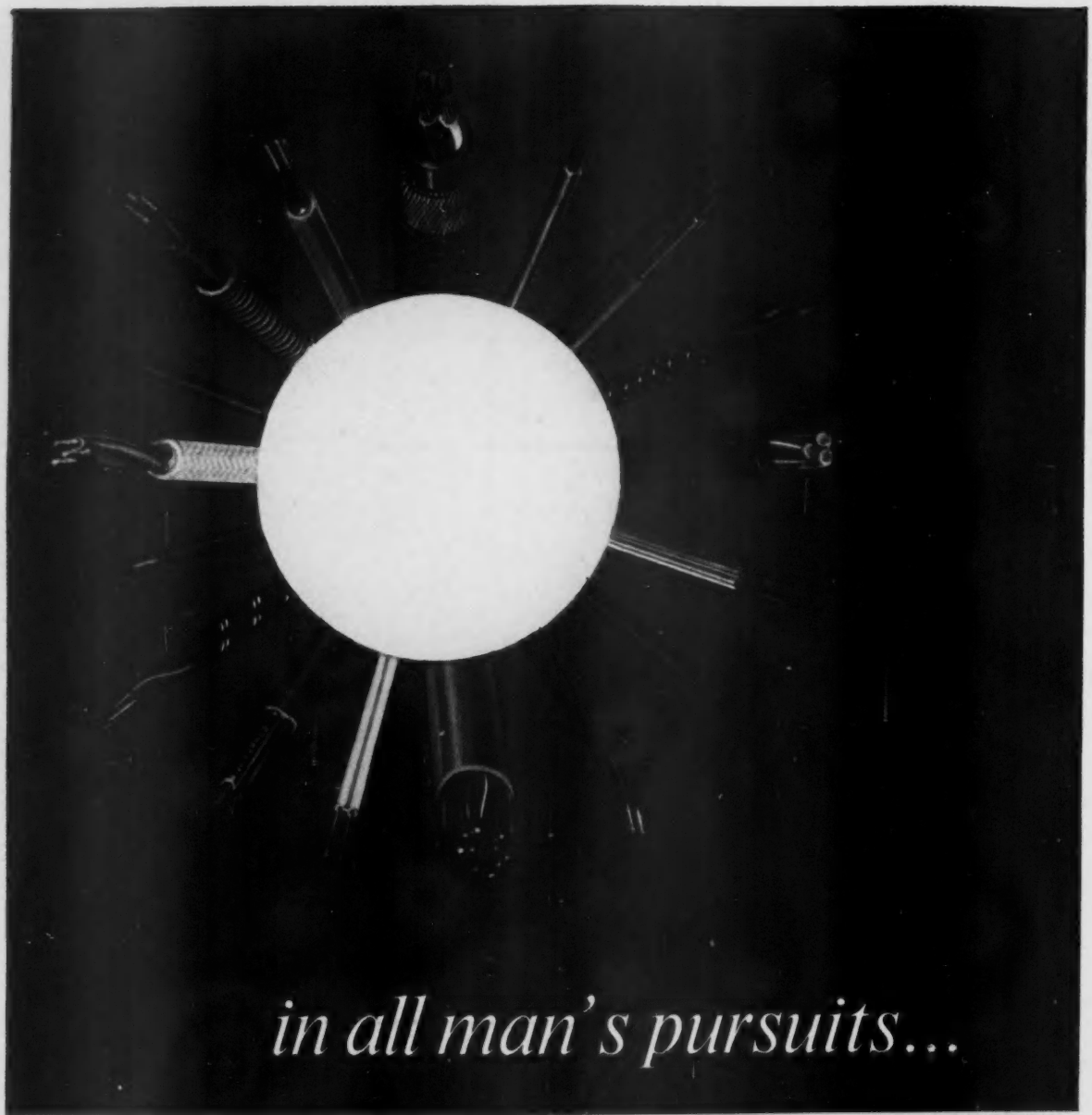

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